PAGE	LINE	
		De Sanctis, S. and Neyroz, U. Experimental Investigations Concerning the Depth of Sleep. Trans. by H. C. Warren. *Psychological Review*, 1902, 9, pp. 254–82.
		Moore, T. V., O.S.B. *The Driving Forces of Human Nature and Their Adjustment*. N.Y.: Grune & Stratton, 1948, c. 5.
		Among the short physical treatises that appear in *The Basic Works of Aristotle* (edited by R. McKeon. N.Y.: Random House, 1941), the student will find a complete version of the treatise *On Dreams*. The Aristotelian analysis is very interesting and done in an admirable scientific spirit.
190	26–28	*On the Soul:* b. III, end of c. 10 and beginning of c. 11. See also:
		COS: b. III, lect. 16.
191	18	Reason has the same influence on memory as on imagination, as we shall see in the next chapter. Both powers, in man, have dianoetic as well as purely sensitive functions. Thus the *creative* functions of imagination are matched by the *reminiscent* functions of memory.
192	25–28	*ST:* p. I, q. 84, a. 7.
		OPG: q. 3, a. 9, r. to obj. 22. Here St. Thomas observes that when the cerebral cortex is injured, intellect is impeded in its act of understanding. The reason is plain. Thus, intellect needs images in order to think; and images are correlated with cortical centers and cortical activities. The conversion of the mind to phantasms is verified, in all forms of human knowledge, by our constant use of concrete examples to illustrate the points we are discussing. See also:
		Bray, C. W. *Op. cit.:* pp. 349–53.
		Chapter 16 MEMORY
194	1–18	*ST:* p. I, q. 78, a. 4.
		OT: q. 10, a. 2.
195	1–15	*ST:* p. I, q. 79, a. 6.
		OS: a. 13 .
195	16–28	Moore, T. V., O.S.B. *Cognitive Psychology*. Phila.: Lippincott, 1939, p. VI, c. 5.
195	29–	
196	–2	*ST:* p. I, q. 84, a. 7.
		DPA: c. 4.
196	24–31	Sherrington, C. Introductory. *The Physical Basis of Mind*. Edited by P. Laslett. N.Y.: Macmillan, 1950, p. 3.
196	19–	
197	–2	Maher, M., S.J. *Psychology*. N.Y.: Longmans, Green, 9th edition, 1926, c. 9.

PAGE	LINE	
197	3–19	Aristotle. *On Memory and Reminiscence:* cc. 1 and 2. *IDM:* lect. 8. *ST:* p. I, q. 78, a. 4. Ebbinghaus, H. *Memory.* Trans. by H. A. Ruger and C. E. Bussenius. N.Y.: Columbia University, 1913, pp. 1–2.
197	20–	
198	–18	*IDM:* lect. 5.
198	28–31	Müller, G. E. und Pilzecker, A. Experimentelle Beiträge zur Lehre vom Gedächtniss. *Zeitschrift für Psychologie,* 1900, Ergbd. 1.
199	1	I say here "from the point of view of memory" for the reason that learning is a matter of much more than memory. It is unfortunate that in most of the literature of modern psychology the word "learning" is limited to the level of sense, since sense knowledge is only the beginning of man's education. Thus, as St. Thomas looks at it, the essential process, in human learning, is the formation of habits of mind and will; and it would be a total misunderstanding of his teaching, were we to give anything more than a secondary place to the tasks of memory in the total perspective of man's education.
199	1–21	McGeoch, J. A. Learning. *Psychology. A Factual Textbook.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1935, pp. 306–09.
199	22–	
200	–6	Ballard, P. B. Obliviscence and Reminiscence. *British Journal of Psychology,* 1913, *1,* no. 2, p. 9. (For Ballard, the word "reminiscence" means memory improvement without practice. This is somewhat different from its Aristotelian use where it connotes an active search for images, under the guidance of reason. The two meanings are not opposed since improvement without practice may be due to memory's connection with the higher faculties.) McGeoch, J. A. Experimental Studies of Memory. *Readings in General Psychology.* Edited by E. S. and F. R. Robinson. Chicago: University of Chicago Press, 2nd edition, 1929, pp. 378–82.
201	2–4	Thorndike, E. L., Bregman, E. O., Tilton, J. W. and Woodyard, E. *Adult Learning.* N.Y.: Macmillan, 1928.
201	5–17	Garrett, H. E. *Great Experiments in Psychology.* N.Y.: Appleton-Century, revised edition, 1941, pp. 80–85.
202	9–13	Spearman, C. *The Abilities of Man.* N.Y.: Macmillan, 1927, c. 16.
203	7	McGeoch, J. A. *Readings in General Psychology* (as above): pp. 382–89.

PAGE	LINE	
		Meumann, E. *The Psychology of Learning*. Trans. by J. W. Baird. N.Y.: Appleton, 1913, pp. 281ff.
		Moore, T. V., O.S.B. *Op. cit.:* p. VI, c. 8.
203	8–	
205	–16	James, W. *Psychology*. N.Y.: Holt, 1892, pp. 296ff.
		McGeoch, J. A. *Readings in General Psychology* (as above): pp. 389–96.
205	17–	
206	–2	McGeoch, J. A. *Psychology. A Factual Textbook* (as above): p. 301.
		Pillsbury, W. B. *The Essentials of Psychology*. N.Y.: Macmillan, revised edition, 1925, pp. 217–18.
206	3–20	Ballard, P. B. *Op. cit.*
		Ebbinghaus, H. *Op. cit.*
206	21–	
208	–8	McGeoch, J. A. *Readings in General Psychology* (as above): pp. 399–403.
208	9–	
209	–2	Carr, H. A. *Psychology*. N.Y.: Longmans, Green, 1927, pp. 251–52.
209	7–24	Jung, C. G. *Studies in Word Association*. Trans. by M. D. Eder. N.Y.: Moffat, Yard, 1919.
		It is interesting to compare the groupings here indicated with those that have been worked out from the ink-blot tests (described on pp. 186–87). Thus, geometrical arrangement points to the intellectual type of personality; movement, to the imaginative type; color, to the emotional type.
209	31–	
210	–5	*COS:* b. III, lect. 12.
		ST: p. I, q. 84, a. 7.
		OS: a. 15.
210	11–13	*Posterior Analytics:* b. II, c. 19. See also St. Thomas: *In Aristotelis Posteriora Analytica:* b. II, lect. 20.
210	19–	
211	–10	*ST:* p. II–II, q. 49, a. 1, r. to obj. 2.

Chapter 17 ESTIMATIVE SENSE AND INSTINCT

PAGE	LINE	
212	6–8	*Physics:* b. II, c. 8.
212	10–	
213	–6	*ST:* p. I, q. 78, a. 4.
		OS: a. 13.
		DPA: c. 4.
213	7–	
214	–15	*AG:* b. II, c. 66.

PAGE	LINE	
		ST: p. I, q. 83, a. 1; p. II–II, q. 95, a. 7. *In Aristotelis Physica:* b. II, lect. 13.
214	26–27	*ST:* p. II–II, q. 95, a. 7.
214 215	29– –2	McDougall, W. *An Introduction to Social Psychology.* Boston: Luce, revised edition, 1926, p. 30.
215	5–16	*ST:* p. I, q. 78, a. 4.
215 216	25– –23	McDougall, W. *Op. cit.:* c. 2. O'Toole, G. B. *The Case Against Evolution.* N.Y.: Macmillan, 1925, pp. 247–48. Wasmann, E., S.J. *Comparative Studies in the Psychology of Ants and of the Higher Animals.* Trans. by J. Gummersbach. St. Louis: Herder, 1905.
216	34–37	McDougall, W. and Watson, J. B. *The Battle of Behaviorism.* N.Y.: Norton, 1929.
217	17–20	*AG:* b. II, c. 82.
217	20–37	*ST:* p. I–II, q. 13, a. 2, r. to obj. 3; also q. 11, a. 2.
218 219	4– –18	McDougall, W. *An Introduction to Social Psychology* (as above): cc. 3 and 4; supplementary c. 4. ———. *An Outline of Psychology.* London: Methuen, 3rd edition, 1926, c. 5.
219 220	19– –3	Hunter, W. S. *Human Behavior.* Chicago: University of Chicago Press, 1928, pp. 183–89.
220 221	4– –12	———. The Standpoint of Social Psychology. *Psychological Review,* 1920, 27, pp. 248–50.
221	13–21	Descartes, R. *Philosophical Works* (*Principles of Philosophy*). Trans. by E. S. Haldane and G. R. T. Ross. N.Y.: Macmillan, 1912, 2 vols. Pavlov, I. New Researches on Conditioned Reflexes. *Science,* Nov. 1923, pp. 359–61. Loeb, J. *Comparative Physiology of the Brain and Comparative Psychology.* N.Y.: Putnams, 1900, c. 13. Watson, J. B. *Behaviorism.* N.Y.: Norton, revised edition, 1930, cc. 5 and 6.
221	22–29	Köhler, W. Intelligence in Apes. *Psychologies of 1925.* Edited by C. Murchison. Worcester: Clark University Press, 1925, c. 7. Washburn, M. F. *The Animal Mind.* N.Y.: Macmillan, 4th edition, 1936. Yerkes, R. M. *Almost Human.* N.Y.: Century, 1925.

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221	30–	
222	–3	Wasmann, E., S.J. *Instinct and Intelligence in the Animal Kingdom.* Trans. by J. Gummersbach. St. Louis: Herder, 1903.
		Fabre, H. *Bramble-Bees and Others.* Trans. by A. T. de Mattos. N.Y.: Dodd, Mead, 1915.
		Mercier, D. *A Manual of Scholastic Philosophy.* Trans. by T. L. and S. A. Parker. St. Louis: Herder, 1919, vol. I, pp. 214–17. See also:
		Muckermann, H., S.J. *The Humanizing of the Brute.* St. Louis: Herder, 1906.
222	8–10	Fabre, H. *Op. cit.:* c. 7.
222	11–13	Driesch, H. *The Science and Philosophy of the Organism.* London: Black, 1908, vol. II, p. 47.
222	15–20	Jennings, H. S. *Behavior of the Lower Organisms.* N.Y.: Columbia University Press, 1931, pp. 251ff.
223	11–24	Köhler, W. *The Mentality of Apes.* Trans. by E. Winter. N.Y.: Harcourt, Brace, 1925.
223	25–34	Mercier, D. *Op. cit., loc. cit.*
223	35–	
224	–8	*ST:* p. I–II, q. 13, a. 2, obj. 3, and reply. (Italics mine.)
225	15–33	*In Aristotelis Analytica Posteriora:* b. II, lect. 20.
		In Aristotelis Metaphysica: b. I, lect. 1.
		Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 144–46.
		Fabro, C. Knowledge and Perception in Aristotelic-Thomistic Psychology. *New Scholasticism,* Oct. 1938, pp. 337–65.
		Chapter 18 EMOTION AND OUTER BEHAVIOR
227	14–18	*ST:* p. I, q. 81, a. 1. See also:
		OT: q. 22, a. 3, r. to obj. 4.
227	19–	
228	–2	*ST:* p. I, q. 80, aa. 1 and 2.
228	15–19	*OT:* q. 25, a. 2; also q. 26, aa. 2–5.
228	26–	
229	–3	*ST:* p. I–II, q. 22.
229	34–35	*In Aristotelis Ethica ad Nichomachum:* b. X, lect. 6. See also:
		AG: b. I, c. 90.
230	16–23	Fröbes, J., S.J. *Psychologia Speculativa.* Freiburg: Herder, 1927, tome I, pp. 209–13.
230	38–	
231	–6	*ST:* p. I–II, q. 32, a. 1, r. to obj. 3.
231	27–31	*COS:* b. III, lect. 4.
		The fact that the knowledge of the other senses can also furnish motives of sensitive appetition may be gathered from

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		another passage of St. Thomas (*ST:* p. I, q. 81, a. 3, r. to obj. 2) where he says: "Sensitive appetite is naturally moved not only by estimative in the animal and cogitative in man, but also by imagination and [the other powers of] sense." From the context of the passage, however, it is apparent that Aquinas is referring to the sensing and imagining of pleasant and unpleasant objects—the final appreciation of which, precisely as pleasant and unpleasant, belongs to estimative or cogitative.
232	12–14	*ST:* p. I–II, q. 22, a. 3.
		OT: q. 26, aa. 2, 3, and 10.
234	6–17	*AG:* b. I, c. 89.
		In Petri Lombardi Quatuor Libros Sententiarum: b. III, d. 26, q. 1, a. 2.
		DPA: c. 5.
234	19	*ST:* p. I–II, qq. 23–25.
		Only anger, in the list of Aquinas, has no opponent emotion. Since it arises from affective possession of a difficult evil, its contrary would be occupied with affective possession of a difficult good. Moreover, since anger deals with an evil that is too difficult to avoid, the emotion opposed to it ought to be concerned with a good that is too difficult to retain. W. M. Marston (*Emotions of Normal People.* N.Y.: Harcourt, Brace, 1928, pp. 102–12) mentions several cases where this seems to be verified, for example, during courtship, in hunting and parental activities, and so forth. St. Thomas considered the possibility of such a feeling state, but he dismissed it on the grounds that a good cannot be actually possessed and still retain its difficult-to-attain features. Thus, the emotions involved in the situations described by Marston can be accounted for by categories that are already set up. For example: the possession of any good, difficult or otherwise, brings *joy*. Should the danger of losing it arise, there is *fear*. Should it be lost, there is *sorrow*. In the last two cases, it is the appearance of an unfavorable factor which causes the emotions, since the deprivation of a good is in the nature of an evil. (See *ST:* p. I–II, q. 23, a. 3; q. 35, a. 1, r. to obj. 3; q. 36, a. 1.)
234	20–22	Schramm, G. J., O.S.B. The Mediaeval System of Emotions. *Peking Natural History Bulletin, 7*, p. IV, pp. 275–81.
234	23–33	Jennings, H. S. *Behavior of the Lower Organisms.* N.Y.: Columbia University Press, 1931, pp. 17ff.
234 235	33– –4	Bühler, C. B. *The First Year of Life.* Trans. by P. Greenberg and R. Ripin. N.Y.: Day, 1930, pp. 21–73.

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235	5–10	Hunter, W. S. Delayed Reaction in Animals and Children. *Behavior Monographs,* 1912, 2, no. 6.
235	10–18	Hetzer, H. and Wislitzky, S. *Kindheit und Jugend.* Leipzig: Hirzel, 1931, p. 79ff.
235	19–29	Moss, F. A. Study of Animal Drives. *Journal of Experimental Psychology,* 1924, 7, pp. 165–85.
235	30–	
236	–3	Ts'ai, L. S. *China National Research Monographs.* Peiping: 1932, *1.*
236	4–15	Holden, F. *A Study of the Effect of Starvation upon Behavior by Means of the Obstruction Method.* Columbia University, 1926.
236	16–22	Marston, L. R. *University of Iowa Studies in Child Welfare.* Iowa City: 1925, 3, no. 3, pp. 50–57.
236	23–31	Kimmins, C. W. *Children's Dreams.* London: Longmans, Green, 1920.
236	32–	
237	–4	Watson, J. B. *Psychology from the Standpoint of a Behaviorist.* Phila.: Lippincott, 2nd edition, 1924, pp. 220–21.
237	11–27	Darwin, C. *Expressions of the Emotions of Man and Animals.* N.Y.: Appleton, 1872.
237	28–	
238	–9	Lange, C. G. and James, W. *The Emotions.* Edited by K. Dunlap. Psychology Classics, vol. I. Baltimore: Williams and Wilkins, 1922.
238	10–	
239	–6	Cannon, W. B. The James-Lange Theory of Emotions: a Critical Examination and an Alternative Theory. *American Journal of Psychology,* 1927, 39, pp. 106–24.
		———. Again the James-Lange and the Thalmic Theories of Emotion. *Psychological Review,* 1931, 38, pp. 281–95.
239	9–10	McDougall, W. *An Introduction to Social Psychology.* Boston: Luce, revised edition, 1926, p. 35.
239	16–24	Watson, J. B. *Behaviorism.* N.Y.: Norton, revised edition, 1930, c. 7.
239	25–32	Freud, S. *A General Introduction to Psychoanalysis.* Trans. by G. S. Hall. N.Y.: Boni and Liveright, 13th edition, 1924, lect. 26.
		Hendrick, I. *Facts and Theories of Psychoanalysis.* N.Y.: Knopf, 1934, cc. 1, 5 and 6.
239	33–	
240	–3	*ST:* p. I–II, q. 27, a. 4; q. 28, a. 6.
240	4–18	*ST:* p. I–II, q. 22, a. 2, r. to obj. 3. Here St. Thomas says: "The material element in the definition of the movement of sense appetite is the natural change in the organs [of the body]."

PAGE	LINE	
241	15–17	*ST:* p. I–II, q. 77, a. 6.
241	18–	
242	–10	*ST:* p. I–II, qq. 59–61. See also:
		Warren, H. C. and Carmichael, L. *Elements of Human Psychology.* Boston: Houghton Mifflin, revised edition, 1930, pp. 239–41.
		Dockery, F. C. *General Psychology.* N.Y.: Prentice-Hall, revised edition, 1935, c. 19.
		Besides feeling and emotion, there is a wide range of appetitive experience that goes under the general name of *sentiment.* Perhaps the simplest way of describing such phenomena is to say that they are constellated feelings and emotions with images and ideas at their core. Because a sentiment demands insight, it is proper to man alone. For some of the modern interpretations of sentiment see:
		McDougall, W. *Op. cit.:* c. 5.
		Warren, H. C. and Carmichael, L. *Op. cit.:* pp. 241–45.
		Gemelli, A. E., O.F.M. Emotions et Sentiments. *Revue de Philosophie,* 1931.
242	25–26	*AG:* b. II, c. 66.
		ST: p. I, q. 83, a. 1.
242	27–	
243	–10	*DPA:* c. 5.
		AG: b. II, c. 82.
		ST: p. I, q. 75, a. 3, r. to obj. 3; q. 78, a. 1, with r. to obj. 3 and 4.
243	24	*On the Soul:* b. III, c. 8. See also:
		ST: p. I, q. 76, a. 5, r. to obj. 4.
243	11–	
244	–11	Carrel, A. *Man the Unknown.* London: Hamilton, 1935, c. 3.
		Chapter 19 THE NATURE OF SENSITIVE LIFE
245	1	*ST:* p. I, q. 97, a. 3.
246	6–11	*AG:* b. IV, c. 11. See also b. I, cc. 97 and 98.
246	22–	
247	–16	*ST:* p. I, q. 27, a. 5; q. 78, aa. 3 and 4; q. 85, a. 2, r. to obj. 3.
		AG: b. I, c. 65.
		OT: q. 8, a. 5; a. 7, r. to obj. 2 (last series); q. 26, a. 3, r. to obj. 4.
		In Petri Lombardi Quatuor Libros Sententiarum: b. I, d. 40, q. 1, a. 1, r. to obj. 2.
247	32–	
248	–2	*In Aristotelis Ethica ad Nicomachum:* b. X, lect. 6. See also:
		ST: p. I, q. 81, a. 1.
248	16–25	*DPA:* c. 5.

PAGE	LINE	
248	26–	
249	–23	*AG:* b. II, c. 82.
249	24–	
250	–4	*AG:* b. II, c. 57. Here St. Thomas is speaking primarily of the oneness of the human composite; but his argument applies *a pari* to the basic unity of the animal.
250	4–8	*ST:* p. I, q. 76, a. 3.
		Chapter 20 THE ORIGIN AND DESTINY OF ANIMAL LIFE
251	1–20	Wasmann, E., S.J. *Modern Biology and the Theory of Evolution.* Trans. by A. M. Buchanan. St. Louis: Herder, 1923, pp. 283–84.
252	5–6	*On the Soul:* b. II, c. 3. Aristotle expresses the same idea and its implications in somewhat different fashion when he says (*History of Animals:* b. VIII, c. 1): "Nature proceeds little by little from lifeless matter to animal life in such a way that it is impossible to fix the exact line of demarcation. Thus, after matter-without-life, in the mounting scale, comes the plant; and among the plants, one differs from another in the apparent fullness of its living perfection . . . so that a continuous grade of ascent towards the animal is observed."
252	10–11	*AG:* b. II, c. 91. See also: *In Petri Lombardi Quatuor Libros Sententiarum:* b. III, d. 26, q. 1, a. 2. *OT:* q. 15, a. 1. *OSC:* a. 2.
252	29–30	*ST:* p. I, q. 65, a. 3. See also: *AG:* b. III, cc. 69, 70, 76, 77, and 94.
253	7–	
254	–31	For references to St. Thomas's teaching on substantial form, see c. 4 of our text. For further readings on the problem, especially in its modern applications, see: Wasmann, E., S.J. *Op. cit.:* pp. 296–302. Adler, M. J. *Problems for Thomists. The Problem of Species.* N.Y.: Sheed & Ward, 1940.
255	5–6	Lecomte du Noüy, P. *Human Destiny.* N.Y.: Longmans, Green, 1947, p. 57.
255	7	James Ussher was born in 1581 and died in 1656. He was archbishop of Armagh, Ireland, and one of the greatest biblical scholars of his time.
255	15–24	Bather, F. A. Address delivered to the Cardiff Meeting of the Geological Section of the B.A.A.C., Aug. 24, 1920.
256	12	The work of Gregor Mendel, Augustinian monk, on the prob-

PREFACE TO REVISED EDITION

Everyone today is aware of the vast development of recent science and the many problems which this development has introduced. Its extension and complexity have been almost overwhelming. Moreover, in the wake of such development is the momentous task of relating and integrating its extensive array of data and theory.

What has been true of science in general has been equally true of psychology. The dissemination of psychological investigations and interpretations, both valid and invalid, has been so widespread that we meet it everywhere. Consequently, whether a student takes only a few courses in psychology, or whether he proceeds to graduate studies and degrees in the field, or even if he merely reads about it in the daily newspapers and popular magazines, he cannot easily escape its influence. But, though psychology as a science aims at helping a person understand himself and others, its effects are often more confusing than enlightening. The individual psychology student usually finds himself confronted with a mass of information on highly particularized and complicated areas of investigation while, at the same time, he is at a loss to know how to put all this knowledge together and arrive at an understandable and workable awareness of the whole man. He requires not only information, but integration as well, so that he can relate psychological fact and theory into a coordinated and adequate view of the human person. Then, in addition, he needs to see how the science of psychology is related to other sciences, to the whole of reality, and to the ultimate meaning and purpose of human existence in time and eternity. In this way he is in a position to evaluate the mass of popular and scientific psychological data as he meets it, not only in the classroom, but on every side.

This integration and orientation, so indispensable to modern psy-

chology, yet so often lacking in many texts of General Psychology, has been the outstanding characteristic of Father Brennan's work. His book combines the results of much important modern investigation with a perspective of man in his final purpose and meaning. Such a significant combination is seldom found in psychological studies. It is not surprising, then, that through the years his text has been so effective and gone through so many reprintings. After fifteen years of use in a wide variety of college and university classes, this text has now been revised. Father Brennan presents his revision from the wealth of background of his long years of teaching, the suggestions of professors who used the text through the years, and—as the observant reader will notice when he compares the revision with the original text—with an even deeper penetration into the root principles of human nature. This revised work will undoubtedly be given an even greater reception than its well-known and widely-used predecessor.

To supply the means for the integration and ultimate orientation of the vast modern developments in psychology, Father Brennan turns to Saint Thomas Aquinas. Father Brennan goes into the writings of Saint Thomas, however, not as one might make an historical study on a great medieval thinker, but as a modern psychologist thoroughly acquainted with all the present-day facets of this science, who yet finds in the living thought of the Angelic Doctor, the most complete and adequate means for the integration and orientation of science, even the vast and overwhelming expanse of modern science. Saint Thomas's ideas are important to the modern psychologist, and to all modern thinkers, not because he lived and wrote in the past, but because his thoughts, in their penetration of the immediate and ultimate relationships of reality, still remain today the best and most complete unfolding of the total portrait of man in himself and in his final purpose. As the wrist, looked at without the fingers, appears to be impractical, so at first glance, philosophical principles and theological concepts may not of themselves appear to have too much practical significance for the investigative sciences, and in particular for psychology. But as the fingers themselves, with all their thousands of nerve endings and their complex muscular and vascular inter-relationships, would be practically useless to man without the coordination which the wrist and forearm afford them, so the extremely complex developments of the various

phases of psychology gain immeasurable strength and integrity when they are related to Thomistic philosophical and theological principles.

Modern psychology is returning to a personalistic approach, with increasing emphasis on the psychosomatic aspects of human nature. This, too, is the core of Thomistic psychology. For this reason, the basic philosophic approach of Saint Thomas provides a solid groundwork and a frame of reference for the interpretation of both the findings of the laboratory analyses and the discoveries of clinical psychology. In this way, the essentially dynamic character of the Thomistic approach provides the principles which will be illustrated and clarified through the results of scientific research.

But since psychology, as a study of *man in himself,* is naturally orientated both towards ethics, or the study of *man in his end and purpose,* and towards theology, which delineates man's ultimate goal and final purpose, the Christian psychologist can never turn his vision entirely away from God as supernaturally known. So, says Saint Thomas:

> "The whole consideration of human reason, in its efforts to order the truths found in all the sciences, has for its end the knowledge of the divine science [which is theology]." [1]

Here is the basic principle of Thomistic integration. While St. Thomas would have agreed that the proper study of mankind is man, he would have further insisted, as Father Brennan points out in his text, that the only final adequate study of mankind is God.

> "Philosophy," says Saint Thomas (and this surely includes psychology as the philosophy of human nature) "is wisdom only as long as it is subject to divine wisdom . . . Withdrawn from God, it becomes foolishness." [2]

In the light of this, we can say that Saint Thomas, were he alive today, would still maintain, in the face of the vast extension of modern science, that any science of human nature which is not rightly subordinated to true philosophy is also a species of foolishness. Final integration only becomes possible if the science of man is directed towards a true philosophy of human nature, which phi-

[1] *Exposition of the Book of Boethius on The Trinity:* question 6, article 1, response to the third part.

[2] *Commentary on I Corinthians:* chapter 15, lecture 5.

losophy in turn is itself orientated towards a true knowledge of God.

Elsewhere, Father Brennan has expressed the creed of the modern Thomist in this way: "If we are to be true Thomists, we must think and speak and write in terms of the problems of our age," and "be vibrating with the lifepulse" of that age.[3] This revised text of *General Psychology* is a sound demonstration of the work of a Thomist who is "vibrating with the lifepulse" of his age, while, at the same time, he holds before the student the vision of man as a creature whose ultimate destiny is to attain God eternally.

CHARLES A. CURRAN

ST. CHARLES COLLEGE SEMINARY
COLUMBUS, OHIO

[3] *Essays In Thomism.* Edited by Robert E. Brennan, O.P. New York: Sheed & Ward, 1942, p. 20.

PREFACE TO THE FIRST EDITION

It is not an easy task to introduce a textbook of this sort, especially to a public with which I am but slightly acquainted. Yet I am willing to assume the risk on the grounds that certain valuable features of Dr. Brennan's book should be pointed out beforehand; and further, because the spirit that pervades the entire text is just the one that I should like to see at work everywhere in psychology. There are two things of which I am equally well convinced: *first,* that psychology can hope for ultimate progress only by becoming rooted in philosophic strata; *second,* that of all the various current philosophies, the one upon which Dr. Brennan has founded his theories is by far the most profitable for a genuine science of human nature. Both these points inevitably involve a rather lengthy discussion, but it is important that they should be grasped by the student before actual work on the text is begun.

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Psychology was the last of the natural sciences to disengage itself from philosophy. In fact, up to the first half of the 19th century practically every contribution to the field of psychology was definitely philosophic in character. Even today traces exist of these ancient philosophic moorings. Gustav Theodor Fechner and Wilhelm Wundt, regarded by many as the creators of modern psychology, were both trained philosophers; and William James was at least as much a philosopher as he was a psychologist. But the general tendency, since the birth of psychology as a science nearly a century ago, has been toward a strict separation of the two disciplines. Indeed, philosophy itself—especially the philosophy of Hegel and Schelling in Germany—was largely to blame for the distrust of speculation that had grown up in the minds of most scientists, to

whom facts alone seemed important. The outlook of scholars, however, is again changing. Certainly philosophy is spoken of much more nowadays than it was thirty years ago; and the idea that philosophic speculation is not altogether useless, even for empirical science, seems to be gaining ground once more.

Psychology is a peculiar kind of science. Its peculiarity is perhaps not sufficiently recognized. It is different from all other sciences dealing with factual data, different from biology and physics, from sociology and history. The distinction, however, is not the obvious one that arises out of subject-matter. Physics, for example, is differentiated from history because each of these two sciences deals with a special part or aspect of reality. But all sciences, *psychology alone forming the exception,* have to do *merely* with the facts that they are studying. They are able, and even compelled, to remain strictly within their own limits. The physicist applies the methods of his science to physical objects and there his task is ended. If he feels a desire to develop a philosophy of physics, he ceases automatically to be a physicist and becomes a philosopher. The same thing is true of the historian, the biologist, and the sociologist. But, to repeat, with psychology the case is different. Psychology is the science of inner experience, and will always remain such, in spite of all declarations of the behaviorist or the objective psychologist to the contrary. Is not the behaviorist able to speak of behavior only because he knows beforehand from introspection the significance of the term? And certainly the objective psychologist could attach no meaning to his science if there were no subjective psychology to form an antithetical distinction! But the inner experience is always the experience of something, which something is very frequently not a mental phenomenon at all but an object, a *res ad extra,* as the medieval thinkers used to say. The relations of these objects to one another, and their laws of government, determine the kind and succession of mental experience that we undergo. The fact that orange occupies a position between red and yellow is due, not to any psychological principle, but to the peculiar structure of the world of colors. The evidence and compulsion associated with a syllogism of the *modus Darii*—all men are mortal; Cajus is a man; therefore Cajus is mortal—is not the result of any discoverable peculiarity of the human mind, but of the laws that dominate the world of logic. The general conviction that to strive for good objectives is better than to pursue evil ones—

howsoever good or evil may be defined—is not a mere fact of mental life but the consequence of good being endowed with a greater value than evil. At least the scientific psychologist cannot object that all this is but appearance, and that in reality there is no such thing as color, or that logic is simply an extrajection of mental processes, or that values are only subjective experiences. He cannot object because color is experienced as something different from and independent of mind, and because the laws of logic are experienced as belonging to an objective world of truth, and because value is experienced as being a peculiar side of reality. Apart from what philosophy has to say on these points, psychology as a science has to take account of the *fact* of our experience being undoubtedly determined by non-mental laws. But the experience of orange forming a kind of transition between red and yellow is nevertheless a mental phenomenon; and so is the apprehended succession of propositions forming the syllogism; and so is the knowledge of good being preferable to evil—all of which is tantamount to saying that scientific psychology, in studying its special object, which is the datum of experience, cannot escape the necessity of taking account of objective and non-psychological facts also. Indeed, the psychologist who deliberately limits his endeavors to mental states alone ceases to be a psychologist at all. Other sciences can and must abstract from the relations between their own proper objects and other aspects of the world. The physicist, for example, is not interested in the question whether the facts which he observes and analyzes are real or apparent. For him, alternating currents are simply alternating currents, whether they be produced by some electrical arrangement or by the contraction of human muscles. Of course it may be difficult to decide whether the discussion of such topics as "abstract geometry" or "manifoldness" belongs to physics or to philosophy; nevertheless, there is a marked difference separating these two branches of knowledge. But whereas physical facts are, so to speak, one-sided, mental facts have a bilateral character. Originating within the domain of mind, they also belong somehow to the realm of transpsychic reality.

The unique position of psychology in the system of sciences can also be described in another way, since the problems of which it treats and the mind treating them belong to the same realm of being. Or to state the matter differently, the objective character of other sciences has, to a certain extent, no absolute basis in psychology. For

even under the best experimental conditions, where the observer and the subject observed are two distinct personalities, the results of observation become meaningful only when translated into terms of the investigator's own experience. Further, psychology manifests a diversity of relationships with other sciences that is quite unique. It must ask help from physiology, in order to further its knowledge of the sense organs. There is a part of psychology which seems to be essentially physiological—which fact, however, does not at all prove that psychology has become a branch of physiology. Again, in studying phenomena like love, inclination, moral judgment, preference for values, convictions, *et cetera,* the science of psychology must have recourse to ethics or to logic. Yet, the problems of ethics or of logic are generally believed to belong to philosophy. Scientific psychology, therefore, finds itself in a very curious position bordering on biology and philosophy. But even this fact does not as yet prove that psychology is philosophic by nature or that it cannot fulfill its task without having open recourse to philosophy. One still can object that the points on which the scientific psychologist must appeal to the philosopher are very few, even if highly important. The position of the science of psychology between biology and philosophy, however, is simply the consequence of the position allotted to the object which it is the business of the psychologist to study. Man is both a living organism and a being endowed with a sense of morality, a conscience, and feelings of responsibility. Whatever is said to the contrary, the human mind knows itself to be different from the body to which it is linked. The psychophysical problem is a fundamental issue and cannot be ignored. Yet neither biology, nor psychology, understood simply as the science of mental phenomena, has solved it. Even to approach it requires a standpoint which is beyond the confines of both biology and psychology, since it cannot be found elsewhere than in the field of philosophy. The same thing is true of the problem of free will. Determinists say that human liberty is an illusion, and that human activity is restricted by the same causal principles which are operative on the level of inert matter. It is not my purpose to discuss here whether the concept of physical causality has lost its significance and import because of the impossibility of calculating the sum total of factors at work in the microcosmos. Such a quasi-philosophic contention, put forward by certain metaphysically minded physicists, appears to me

principles and of building their theories upon philosophic foundations. Professor Karl Bühler, of the University of Vienna, is a representative of the same attitude. But even if such a need were fully recognized by the majority of scholars, there still remains the question of settling upon a satisfactory philosophy. Several systems exist, each professing its own views and speaking its own language; and these views are often, needless to say, of quite a different or even opposite character. The confusion of tongues at the tower of Babel could hardly have surpassed the status of modern philosophy. The followers of Kant, or Hegel, or Thomas Aquinas, or Whitehead, may indeed be employing identical terms, but their ideas are often utterly divergent. Small wonder, then, that the psychologist should experience bewilderment when he is told that his science has need of a philosophy, and that he must make a selection among the numerous systems in vogue today. Is there any criterion to guide him in his choice? I believe that there is, just as I believe that in applying such a criterion he need not rely on concepts that are foreign to his special field. The clue is simple enough. It consists in asking: which philosophic system promises the greatest measure of help, which one, out of all the current forms, is by nature designed to offer the easiest and best psychological explanations? It is easy to see that materialism, for example, will not help. To say that mental phenomena are nothing more than manifestations of very intricate brain processes is of no avail. For it soon becomes apparent that the materialist's claim to be close to reality is the result of self-deception. Nor is the case very different with the philosophy of transcendental idealism. Can the discussion of metaphysical categories, or of *a priori* judgments, or of noumena and phenomena, profit the psychologist? I doubt it very much. When the matter is sifted down, there are very few philosophies that have advanced far enough into reality to be of service to science. And among these few, one stands out with definite clearness, because it is nearer to everyday life and everyday reality than any other. It is the philosophy that was developed by the genius of St. Thomas Aquinas out of a long line of Greek and Christian traditions. Why I think that this is the only system to which psychology can safely adhere will be explained immediately. But before going on to this point, I should like to answer an objection that some are sure to raise against my recommendation of Aquinas's philosophy to the psychologist. Scholasticism, it will be said, has

only an antiquarian interest. Aquinas admittedly was a genius, but he belonged to an age that was wholly ignorant of modern science. His views on physics, astronomy, and biology were extremely naïve. He knew practically nothing about gravity, cell-division, or chemical processes. He had less factual information than the average college student of today. How then can he help us in our research work when he is so obviously out-of-date? In reply, let me say, first of all, that medieval scholars possessed a much deeper knowledge of natural science than they are generally credited with. One has but to glance through the huge tomes of Albert the Great to become aware of this fact. In the second place, Thomas Aquinas was a philosopher, rather than a scientist, by profession; and it is his philosophy, not his science, that we are proposing for serious consideration. As a philosopher he was occupied in discovering the laws of order that prevail in the world of visible and invisible entities, and in determining the relative place held by the various levels of being in the total *echelle d'être*. Now, to detect the position of inert matter in such a scheme of reality, it is not at all necessary to have a comprehensive knowledge of the laws of gravity or of the relations between light and electricity. If such demands had to be fulfilled, there could be no philosophy at all. The work of science is never finished, and the amount of information at our disposal today is but a small fragment of the knowledge that will have been accumulated a few centuries hence. Modern physics is, of course, much nearer this goal than it was in the days of Newton, or even of Maxwell. But every physicist realizes perfectly that he is far from having complete control of his subject. Science is, indeed, as Kant described it, an infinite task. And yet, to know the essential nature of the objective world with which physics deals, just a few simple and easily observed facts are required, such as the transformation of water into vapor through boiling, the falling of heavier-than-air objects to the ground, the production of undulatory waves when a stone is cast into water, and so forth. Further, that plants are living structures and differentiated from animals enables us to assign them their place in the order of being. No complicated experiment is necessary to recognize that sensitive life is more highly developed than simple vegetative life. Even if there are intermediate forms—a possibility familiar to Aristotle—it would nevertheless be true that a highly specialized plant belongs to a lower order of being than a lowly

specialized animal. The famous Linnean formula *natura non facit saltus* was uttered by a scientist, not by a philosopher. The idea of applying the principle of identification not merely to movement and processes, but to structures as well, never occurred to the medieval thinker. His unsophisticated mind failed to see any essential oneness between animal and man; and although the anatomical similarities between human and infra-human bodies had been noted, he never doubted that man was endowed with a higher position in the scale of being than the most superior animal. Anyone who denies the obvious hierarchy of nature, wrote Anselm of Canterbury, does not deserve to be called human. The evolutionary theory which supposes a continuous transition between animal and man ignores a whole series of historical facts. Indeed it must deny that man has any history at all, since the animal has none. Human culture and human traditions must likewise go into the discard. Nor can any conscientious observer, whose mind has not been obfuscated by such teaching, be blind to the fact that mental phenomena belong to a level of reality quite different from any other. Now, the science of psychology can find the help that it needs only from a philosophy which acknowledges an essential distinction among several levels of being, and more particularly, the distinction of mental phenomena from other types of reality. So far as I know, there is no philosophy outside that of the schoolmen, which really takes cognizance of the facts just mentioned; and the system of St. Thomas Aquinas is the most consistent of all the scholastics.

Another psychological problem that demands philosophic treatment is the relation between mind and matter. The monistic solution is impossible, as I have already pointed out, because it is based on the impossible assumption that mental and bodily phenomena are identical. Platonic dualism is equally inacceptable, since it provides no hypothesis for understanding the interaction of body and mind. The only plausible theory that I know of is the one originated by Aristotle and adopted by Aquinas. It would lead me too far afield, were I to attempt to show how the concept of mind as the substantial form of the body, giving man his real psychophysical unity, permits a most satisfactory interpretation of the facts of both experience and experiment. This concept is simply a special application of the more fundamental theory of matter and form, which has so many important meanings for scientific psychology. Take, for example, the

rather difficult question of human instinct and its relation to the will. Though different from each other, both these tendencies are undoubtedly connected in some manner. Psychoanalysis teaches that volitional phenomena are transformed instinctive reactions. Another species of mental science holds that will power is simply an inhibitory animal drive. But neither account is adequate, for the reason that it fails to fit in with our actual experience of things. If, however, the higher levels of mental life are looked upon as utilizing the forces that spring from the lower levels, and if the lower levels are regarded as serving the purposes of the higher levels—in much the same way as prime matter is determined by substantial form—the mutual relation that obtains between human will and human drives immediately becomes more intelligible.

But the real core of Aquinas's philosophic system is his dualistic principle of potency and act. How many scientific psychologists realize that the concept of disposition, of capacity, of hidden possibilities becoming manifest under certain conditions, is a more or less immediate derivative from the old idea of *potentia?* All the intricate problems connected with the relative influence of constitution and environment in character-formation would become much clearer if the basic teaching of potency and act were applied to them. Thus *potentia* does not become *actus* without the addition of some factor which transforms it. I have explained elsewhere why, in my opinion, the reduction of all characterological features to hereditary influences is no less one-sided, and therefore no less wrong, than the accrediting of environmental factors with a kind of omnipotence.[1]

I should like to close my list of fundamental philosophic principles with a brief discussion of what Aquinas calls the principle of analogy. Broadly speaking, analogy signifies a kind of similarity co-existing with dissimilarity. Aquinas uses the idea repeatedly in analyzing the nature and attributes of God. Thus, the similarity between the Creator and His creation can never become so great that the dissimilarity is not much greater. The relations of analogy, however, are not restricted to the theological level. They also exist within the various strata of created being. The notion of causality furnishes an excellent example of their wide application. Causal relations between inanimate bodies are surely not the same as those that regu-

[1] V. *The Psychology of Character,* by Rudolf Allers. Trans. by E. B. Strauss. N. Y.: Sheed and Ward, 1934, pp. 34–40.

late the coördinated movements of a living organism. Again, the laws determining organic functions are different from those that control the motives and operations of the human mind. The concept of analogy provides for several kinds of causality, all somehow alike, yet fundamentally different. The problem of mental disease—an extremely difficult one to define—is also made easier by considering it from the viewpoint of analogy with physical disease; and so too are the problems of moral and social disease.

At least in Germany, psychology has been very much influenced, I think, by Edmund Husserl's program of "Back to reality!" But where can the student find anything so "essentially a system of common sense"—to use the words of Professor Martin S. Gillet, O.P.—as the philosophy of Thomas Aquinas? Science insists that phenomena are to be taken in their full "givenness," with no pre-judgment as to their importance or non-importance. Now, if there is any system that tries to take things at their own value and to follow the lead given by the immediate experience of reality, it is the philosophy of Aquinas. And I am firmly convinced that a closer acquaintance with his teachings will contribute to a restoration of saner views, not only in science, but in the world of practical affairs as well. A good deal of the unhappy state of modern humanity may be directly traced to the fact that thinkers have lost touch with reality. A philosophy of common sense is the only remedy for such a situation. The sphere of influence exercised by the scientific psychologist in particular, makes it important that his thinking be straight and correct. His ideas—for better or for worse—are daily filtering into the fields of applied science, into education, psychotherapy, and sociology. This is why I think that Dr. Brennan's work is not only an important contribution to science, but a step forward towards the rehabilitation of mind and humanity.

To the student and general reader alike, therefore, I commend this book, as the old Roman author commended his, with an enthusiastic "*Lege feliciter!*"

RUDOLF ALLERS, M.D.

UNIVERSITY OF VIENNA, 1936
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NOTE: This is a slightly revised version of the original preface, done with Dr. Aller's permission. The Author.

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1937. THE AUTHOR

2. *Second edition*

Since the foregoing was written, more than fifteen years ago, some of my academic and critical readers have died; others have moved on to new spheres of activity. For both living and dead, I still cherish the warmest feelings of gratitude.

During the decade and a half that *General Psychology* has been in existence, I have taught it to hundreds of students. I have been taught by them, in turn, by their fresh young insights; and challenged by their doubts and confusions. Only the teacher knows what a wealth of wisdom and originality lies dormant in the budding mind. The reviews of the book, too, have been a source of information, enabling the author to "get outside his own apperception mass," as Wundt would say, and to see his work with a coldly objective eye. I trust that I have profited by their friendly appraisals.

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1952. THE AUTHOR

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THE PSYCHOLOGY OF THOMAS AQUINAS

1. Roads to Wisdom

There are two ways of approaching philosophy. One is to study an already existing system, gain as deep a knowledge of it as possible, and keep checking back with the facts of experience to see how the system is proved true. The other is to study the facts first, break them down into their component parts, fit them in with other related facts, and then turn to some principle by which they may be interpreted.

The first is the easier and more common method. Its drawback lies in its very smoothness. The facts of experience come peeping slyly round the corners of our consciousness, but we seem scarcely aware of their presence. At any rate, there is the danger of our overlooking their real meaning, or of taking for granted that we know all about them. With such a frame of mind, there can be little room for doubt or uncertainty. Thinking has no fears or toils; and any challenging ideas that may strike us are born in a kind of painless twilight. The system sees to it that they cause us no pangs. If we pursue this road to learning, we may turn into good students of philosophy; but there is no guarantee that we shall become good philosophers.

The second method has been followed only by the few. Of those who hazard their wits at it, some fall into the slough of despond, and eventually give up the task. But some emerge with their minds well matured in a fixed point of view; and these, whether by right conclusions or wrong, are at least thinkers, and at heart philosophers. Their doubts are their own; and their wisdom is the living reaction of their minds to the world in which they dwell.

St. Thomas Aquinas belongs to the last-named group. He begins with reality; and in this respect, he is like the best of our modern men of science. Moreover, his grip on reality is tight and strong. The huge fist that crashed down on the table of King Louis is a fitting symbol of the mind that fought relentlessly against error. Aquinas is guilty at times of mistakes. But when he is wrong, the weakness will not be found in his power to draw right inferences, but rather in the limitations set by the science of his day on the powers of natural observation. Tools were scarce; and men had to depend on the sharpness of their naked senses. So the number of facts from which scientific knowledge could be wrested was relatively small. I believe that Aquinas was aware of this. Commenting on some of the views of the astronomers of his time, he says: "Their theories may seem to explain the facts. Still, it does not follow that such explanations are the real ones, since it is possible that some other account, unkown to men as yet, should be given of the movements of the heavenly bodies."

After seven hundred years, the attitude of the scientist has not changed a great deal from that of Aquinas; as witness the words of Eddington: "Proof is an idol before whom the pure mathematician tortures himself. In physics we are generally content to sacrifice before the lesser shrine of *Plausibility*. . . . In science we sometimes have convictions as to the right solution of a problem which we cherish but cannot justify." Nor was the attitude of Aristotle, master thinker among the ancients, much different. After discussing some of the strange habits of bees, he sums up his findings with the cautious remark: "The facts, however, have not yet been fully enough observed. If and when they are, credit [for the advance of our knowledge] must go to observation rather than to theory; or to theory only on the condition that it has been found in agreement with the facts of observation."

2. *Points of Departure*

What I want to stress here is not the incidence of error in Aquinas, since the science of his day was still fumbling with the keys to nature's secrets. Rather, I should like to call attention to something more meaningful, to his way of thinking, than the mere making of mistakes. I refer to his *fundamental reverence for fact.* Aristotle had it—in a high degree; and we know that the shape of

causes. . . . Attempting to reach the truth of a matter without examining its pros and cons is like the case of the man who sets out on a journey without knowing where he is going. . . . If he arrives at his goal, it is only by chance or good fortune. . . . So one may be in quest of the truth and not know when he has reached it. . . . If, therefore, we really want to get at the solution of a problem, we must sift and sort all the evidence presented by those who hold views opposed to our own."

3. *The Psychology of St. Thomas*

Aquinas wrote no formal textbook on psychology. The fact is that his growth in the knowledge of human nature was only part of a larger historical development that had to do mainly with growth in the knowledge of God. But his interests in creation and all the deep laws of being were so intense that the study of man was unavoidable. This is not to say that he would not have bothered about psychology, did it not have so much meaning for theology. On the contrary, he would have admitted at once that the *proper* study of mankind is man. But he would have added that the *adequate* study of mankind is God. Thus, "the whole consideration of human reason, in its efforts to order the truths found in all the sciences, has for its end the knowledge of divine science [that is, of theology.]" In practice, therefore, he went on the principle that better acquaintance with our own nature can lead us to better acquaintance with God; that both knowledges, in fact, are ordained to ultimate union in the vision of the Divine Essence.

Accordingly, from a wide range of writings on man in his nature, we shall try to present the teaching of Aquinas in a way that makes a living whole of his views on psychology. We may even call this teaching a system—a favorite term with the moderns—provided, of course, we understand that St. Thomas's system is always alive to new sorts of ideas; that it is capable of absorbing what is good for its organism; that it hangs together as a living whole; and that, as something which has stood the wear and tear of centuries, it still has much to offer the modern psychologist who is looking for a satisfactory framework on which to hang the fruits of his researches.

I. METHOD

The first care of the beginner in psychology, as elsewhere, is the method of the particular body of knowledge he is about to study.

Now, the basic law of method for all knowledge is advance from fact, or what we grasp by immediate experience, to the principle behind the fact. We start with what is best known, and work by degrees towards what is least known. After all, this is the only sensible way of learning. As St. Thomas counsels the student John: If you plunge at once into the sea, you are lost. But, if you enter first by a stream that empties into a river, then go by the river till you get to the sea, there is reason to believe you can keep afloat. Or, to change the figure, we set off on our journey at the fact-finding level which is the stage of invention. Then we travel, step by step, up the ladder of generalized knowledge. Our goal is synthesis; and our arrival there is heralded by the appearance of some ultimate law or principle that explains the facts with which we started, at the same time that it furnishes a clue to the meaning of other facts as yet unknown to us. Once the law or principle is mastered, we can make it the point of departure for further and more particular inferences.

What I have just said applies equally well to science and philosophy; but I shall illustrate it from the latter branch of knowledge. The division of being into potency and act was evolved in the mind of Aristotle from his study of change in the physical world. Once the idea became clear to him, it was possible to put it to use in areas not connected with physical change. To repeat, then: the method of analysis represents a gradual ascent in the scale of generalized knowledge, while the method of synthesis works in the other direction, once the law or principle has been rightfully proclaimed. Science leans heavily on the first kind of technique; philosophy, from its nature, finds more use for the second. Still, one mode is so helpful in improving the other that there are constant interchanges between the two.

Starting with such facts as fall within the experience of all men, Aquinas builds up his knowledge of human nature. His system of psychology is philosophic for the most part, since the bent of his genius is clearly more towards synthesis than analysis. Perhaps we might think of it as having two aspects: one *material*, dealing mainly in facts which were to become the specialized field of research for the scientist; the other *formal*, occupied chiefly with the final meanings we attach to these facts, and therefore the proper concern of the philosopher. And because Aquinas himself was so deeply attached to ultimate meanings, we can truthfully say that the

essence of his psychology is philosophic. Another way of picturing it would be to say that the psychology of St. Thomas is a happy balance between knowledge of the contingent and knowledge of the necessary in human nature; that is, between the observed facts of experience and the final conclusions that follow from these facts.

II. INTROSPECTION

What we have said up to this point touches on method in general. It is the way our minds work in laying up any branch of knowledge: beginning with what is immediate and obvious, such as the things we see, hear, and feel; and moving on to deeper and more hidden but no less true realities, such as the existence of a *psyche* or soul, to account for our living experiences. But for Aquinas and most of the moderns, there is a further method, which has its uses in psychology alone. It is of no particular value to the physicist, who studies the structure of matter; nor to the astronomer, who is interested in the movements of stars. But it is a tremendous asset to any one who sets out to study human nature. We call it *introspection* or looking within ourselves; and the reason it is so unique to psychology is that only in this particular field do the subject and object of study coincide. We can stay right at home, so to speak, and learn the essential things about human nature, gazing into the mirror of self in order to see what manner of men we are. All in all, then, we should not have too much trouble with this branch of knowledge, since we can always appeal to personal experience, or what happens within ourselves, when we want to make certain of the recorded experience of others.

St. Thomas, of course, was an introspectionist. Referring to the use of the self-exploratory method, he says: "Those things that belong to the soul by its essence are known through an experiential kind of knowledge: inasmuch as a man, by his acts, is made conscious of the source of these acts. Thus, we realize that we have wills from the fact of our willing; and that we are alive, because we consciously go through the motions of life." For Aquinas, introspection was the surest means of access to the data of psychology. Not to employ it would be like throwing away hammer and saw when we set about building a house; or refusing to turn on a light when darkness overtakes us in our work. As far as Aquinas is concerned, therefore, introspection is the most basic tool for digging

out facts of experience—on the presumption, to be sure, that such facts are the foundation of our knowledge of human nature. If he went outside for additional knowledge, it was chiefly to check on introspectable data. And I should say that most of his mistakes will be found in recording matters that cannot be verified by appeal to the court of introspection. The point is worth noting since so much of the discussion in modern psychology hinges on the value of the introspective method. Is it a lawful way of getting our information? The answer, of course, depends on its use, or the care and precision with which we apply it. When treated like any other trustworthy tool, it may turn out to be our most fruitful source of knowledge. This is the view of Oswald Külpe who says: "Experiment can no more take the place of introspection in psychology than it can that of observation in physics. It is only able, as it is only intended, to supplement the introspective method by filling up the gaps which remain when introspection is employed alone, by checking its description, and by making it generally more reliable." Külpe, we may add, is credited with having been the first among the moderns to make a scientific study of method in psychology.

In the hands of the skilled worker, introspection means the adoption of a special frame of mind which enables the observer to search out details in his experience, as though he were studying them under a magnifying glass. The whole conscious reaction is carefully noted and broken down, if need be, into fractionized periods. The same tasks are done over and over again, so that the account may be corrected and amplified. Sometimes the subject is asked to fix his attention on particular points; but more often he is left to guide his own actions, without previous warning of what he is expected to observe.

What are we to say of St. Thomas's introspection? If we base our opinion on the records he has left, he must have gone about it in orderly fashion. No doubt there were times when he was thoroughly perplexed. But to a man of his patience and remarkable powers of invention, the work of exploring the mysteries of consciousness was merely a challenge to his truth-seeking nature. It is not too hard to picture his method. First, he had to produce the perception, image, feeling, judgment, or whatever mental process his problem called for. Then he had straightway to go over the details of the experience, in order to tell just how he did these things. It is the

task that every great introspectionist has imposed on himself, from Aristotle down to Külpe and the moderns. Under the changing circumstances of time and place, one can never be sure of what he is going to observe, or whether he is examining the same sort of datum in repeated trials. Moreover, there is always the danger of refining one's experiences to the point where they become unreal. This is what happens in too much use of the laboratory attitude, where common or naïve experience is discarded in favor of the so-called corrected experience. To be a good introspectionist, one must be conscious; then conscious of being conscious; then skillful to describe all that happens in consciousness.

What Aquinas very likely did, just as the modern introspectionist does, was to go over the performance of a particular task several times. By degrees, certain common features of all these successive experiences would appear in relief; then what was common could be repeated and studied at closer range. It still remains true for present-day experts in introspection, as St. Thomas must have found out for himself, that the whole content of any given experience can seldom be grasped in all its wealth of detail. The law of limitation of mental energy is against such an achievement. As Francis Aveling says: "We are directly aware of an infinitesimal part of our external sensory experience at any given moment. Our span of consciousness is likewise limited for any aspect of experience whatever. Very many observations, accordingly, may be necessary to disentangle the phenomena of the simplest mental process." But howsoever he searched, the essential reliability of Aquinas's method is shown again and again by the large measure of agreement between his account of introspectable data and the reports given by modern psychologists.

III. CONTENT

The ideal system of psychology is one that envisages all that can be known about man, as a consistent and unified whole. Such a system would embrace the entire range of data that falls within human experience; as well as the laws or principles that make an understandable pattern of these data. We may as well mention here as elsewhere that no complete and perfect system of psychology exists —or ever will exist, for that matter, as long as human nature offers mysteries to be solved. Like any other adventure in human knowledge, psychology must always have its share of confusions, entangle-

ments, even of misunderstandings among otherwise well-intentioned men. Perhaps this is the best reason of all for making clear from the start what I consider to be the core of the Thomistic psychology. To reach this core, it is necessary to step outside the boundaries of our knowledge about man, into the wider reaches of our knowledge about being. For, obviously, what is true about being in general, must also be true about human beings in particular.

Now, the most cursory glance at the pages of St. Thomas's philosophy shows that the one underlying principle which knits together all its branches is *the doctrine of potency and act.* Briefly, it amounts to this: that a thing which is in a state of potency must continue in that condition until it is moved by something which is in a state of act. It is possible, for example, that cold water should become hot. But cold water cannot possibly become hot unless it be moved by something that is actually hot. So much for movement. The doctrine, however, does not rest with the notion of how a thing acts. It also tells us what a thing is: on the principle that the operation of a thing follows the lines of its being and is a true clue to the nature of that being. Accordingly, it holds that all being is divided between potency and act. Thus, whatever belongs to the world of reality can be looked at either as potency; or as act; or as a combination of the two. Here we have reached rock bottom in the philosophy of Aquinas: the principle of real existence, either actual or potential. Let us see how it works out in his psychological teaching.

First, there is his teaching on the oneness of the human composite. The soul of man is the *act* or substantial form of his body, and its only form. The body of man, on the other hand, in its most basic aspect of primary matter, is *potency,* pure and simple. The union of his soul with primary matter at once makes that matter into a body, a living body, and a human body. This is what we mean when we say that man is a composition of soul and body.

Again, the powers of mind and will are really distinct from the soul itself. Since they are perfections of the soul, they stand in the same relation to the latter as act does to potency. But powers themselves are perfected by action. Therefore, thinking is to mind, and choosing is to will, as act is to potency. And so with the rest of our powers.

Finally, powers are set in motion by objects. We see when light

strikes the eye. We hear when sound impinges on the ear. And we know the world of reality because in some way that world impresses itself on the mind. From all this it follows, not only that the powers by which we know are distinct from their objects, but also that they are essentially passive in relation to their objects. Knowledge, in short, must come from the outside; and mind is in potency until such time as it is stirred to act by its *object,* that is, by "something hurled up against" it from without. How wrong, then, to say that it creates this object when, in sober truth, the object is the only reason of its having any thoughts at all!

The same note of potency is discoverable in the will which, though capable of determining itself in the act of choice, yet is naturally passive in respect to its motive. Moreover, like every other creature, it is subject to influence on the part of God, Who makes it and acts on it according to its nature: moving it along to the goal that *He* wants without in the least interfering with its freedom. Any other conclusions than those I have just indicated would endanger the whole system of Aquinas. All of them, moreover, have their roots in the doctrine of potency and act.

4. *Aquinas and Aristotle*

The whole edifice of the Thomistic philosophy is founded on Aristotle. Aquinas would be the first to recognize his debt to the sage of Stagira. Thus, if Albert tutored him in the method of analysis, Aristotle showed him the synthetic power of wisdom and opened his vision to the breath-taking reaches of metaphysics: a vision that stretched from the cellars of the cosmos to the white throne of Him, Who is Life itself, Thought itself, Being itself, "most good and eternal." It is worthy of note that for the greatest of the peripatetics, as for the greatest of the schoolmen, the urge to synthesize came from close contact with men who had a scientific bent of mind. Like Aquinas, Aristotle grew up in an atmosphere favorable to the spirit of exact observation. History tells us that medicine was a tradition in his family. Now, this sort of mental climate is apt to have a positive reaction on a budding philosopher. First, it whets his taste for fact-finding. Next, it stirs up his ambition to set some sort of order in the things he discovers. Finally, it supplies the drive or incentive to form a system, wherein all the masses of data are woven into a harmonious whole and given their final meanings. This con-

stant touch with reality which is a feature of all Aristotle's philosophy is best described by Aristotle himself. His words sound like a passage from his autobiography: "Those who live in close communion with nature and its phenomena grow more and more able to frame principles that lend themselves to a wide and coherent development and that act as the ground of their theories. On the other hand, those who are so given to abstraction that it makes them unobservant of facts, are only too ready to dogmatize on the basis of their scanty observations."

But Aquinas learned more than method from Aristotle. The content of his philosophy (and this is particularly true of his teaching on human nature) is also Aristotelian at bottom. Indeed, there are some who say that he did little more than get in tow with Aristotle's thought. Men who talk like this cannot be well acquainted with either the caliber of Aquinas's mind or the depth and originality of his writings. When the matter is sifted down, it will be found that the real reason for his acceptance of the Aristotelian outlook was neither its authority nor its tradition but the intrinsic appeal of its truthfulness. One might even question if the authority and tradition of Aristotle were widely recognized in the days of Aquinas. The evidence from some quarters seems to point in the other direction; so that in view of the widespread return to Aristotle, which followed on the Thomistic synthesis, one can see a true debt that Aristotle owes to Aquinas.

But the point at issue is something more vital. The baker, let us say, supplies us with bread. We eat and digest it and make it part of our organism. So Aristotle offered food for the mind of Aquinas. Now, the bread, not the baker, means most to the body. So the truth, and not Aristotle, meant most to Aquinas. Thus, wherever the teachings of the Stagirite seemed correct to him, he approved; and the reason he approved was their correspondence with reality. It is the same reason he gives for the study of philosophy: "Not to learn what others have thought, but to come to a knowledge of the truth of things." Accepting the truth from Aristotle because it was true, not because it was Aristotle, was surely the highest motive for intellectual surrender.

However, in the process of nutrition some things are rejected as waste for the body. So, in chewing the cud that was Aristotle's thought, St. Thomas found points that he could not absorb. Only

truth, after all, is proper food for the mind. Nothing was farther from the intention of Aquinas than that his approval of Aristotle should become a refuge of error. One of the very few instances where he shows impatience with his critics is found in an essay that he wrote *On the Unity of Intellect.* Siger of Brabant, himself a great commentator on the philosophy of Aristotle, had remarked that perhaps the meaning Aquinas attached to the text of Aristotle was wrong. To which Aquinas replied, as plainly as could be told, that the issue was not with what Aristotle thought or taught but with what is true. If his opponents could show that their own interpretation of Aristotle was the right one, then so much the worse for Aristotle!

The fact is, St. Thomas took the materials for his philosophy from whatever source he could get them—Greek and Arabian, pagan and Christian—so far as they lay open to him. What he achieved was an organic whole, wherein various sorts of knowledge were given oneness by the presence throughout all their details of a single ruling principle. This principle, needless to say, Aquinas had won by his own hard thinking. Nor did he accept it without consciousness of its stubborn and often troublesome implications. He was willing to be called hard-headed, if truth demanded that of him. At any rate, there can be no doubt of his claim to originality. As part of his great philosophic system, his psychology is a faithful replica of his own views and experiences. And it can be shown, beyond doubt, that he made an effort to check his observations on human nature by constant reference to reality.

5. *Aquinas and the Moderns*

Does the teaching of St. Thomas have a value for present day psychologists? I think there can be very little doubt about it. The unfortunate thing, however, is that too few of the moderns have come in contact with the Thomistic psychology; so that their eyes are not yet open to the fruits of such a study. But interest is growing; and the drift of research towards a whole-making and personalistic view of man's nature, which is noticeable in many quarters, may mean that the moderns are finally awakening to the soundness of this kind of approach. Now, surely the psychology of Aquinas is whole-making and personalistic in outlook. It is nothing, in fact, if not just that! When the scientist sees this (and sooner or later

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Chapter 2
THE NOTION OF GENERAL PSYCHOLOGY

1. A Question of Words

Psychology, in its root meaning, is a study of the soul. But in reality it is more than that, since it also studies the thing that is besouled. Now, when we think of things with souls, at once three kinds of creatures come to mind: plants, animals, and men. There may be others elsewhere in the cosmos, but we have no experience of them. In any case, since psychology is concerned with beings that have a soul, it embraces the lowest as well as the highest manifestations of life on earth. In the proper sense of the word, however, psychology is the study of man. Does this mean that we neglect the plant and animal forms of life when we focus upon man? Not at all—for the reason that man sums up all the powers and perfections of these lower forms in his own higher nature, adding other powers and perfections that are strictly his own.

Like everything else in the world, man makes known his powers and perfections by the way he acts. It is hard to see how we should learn much about him on the inside unless we studied him on the outside. This was plain to St. Thomas who said that we must begin with man's acts, and continue with his powers, before we can finally come to understand what he is in his nature. He was assuming, very rightly, that the powers of a thing are part and parcel of its nature since they are properties which flow from that nature as a source. This was also Aristotle's idea: that the nature of man, like every other nature, is the permanent ground or principle of both properties and operations.

2. *The Study of Man as Man*

St. Thomas would agree, I am sure, that the proper subject matter of psychology is man. Even more, he would insist that this is the underlying point of view of Aristotle in all his psychological teaching. But, whereas Aristotle approached his subject matter with explicit reference to the soul, St. Thomas shifts his vision to man himself. In the long run it amounts to the same thing, since the soul of man is the basic reason of his being a man. But I like to think that the change of focus which Aquinas brought about, by his stress on man as man, is more far reaching; that it provides a better philosophic basis and a surer guide for the drift of psychological thought today. If I may put it in terms of its meaning for history: what the medieval did was to make the ancient more understandable and so of greater service to the modern.

Further, if St. Thomas had the choosing of a name for the study of man, I am sure he would have preferred "anthropology" to "psychology." Actually, neither of these words appears in any of his writings; nor does it make a great deal of difference as long as we remember that the main theme of the Thomistic psychology is man as man; that the soul is simply a part of man, essential to his very being as man, yet only a part; that the body is the other essential part; and that the manifestation of man's being is made through powers or properties that enable him to act.

Now, there are two ways of looking at man, as far as psychology is concerned. The first is to view him from the standpoint of *science,* which is the approach of most of the modern psychologists. The second is to study him in the light of *philosophy,* which is the approach of St. Thomas. The clear separation of these two forms of knowledge is one of the achievements of modern thought. I say "modern" because it could not have been brought into being until the new tools and new methods of modern research had made it possible. As a distinction, it was present only in seedling form in the minds of men like Roger Bacon and Albert the Great—the likeliest people to have foreseen its development. Because of its importance in the divisions of our text, it will pay us to examine it more in detail.

3. *The Thomistic Meaning of Science*

According to St. Thomas, some knowledges are sought simply for the sake of knowledge; and these are called speculative. Others are acquired for the sake of operation; and these are known as practical. The speculative knowledges are the ones we are concerned with here. They may be divided from a two-fold point of view: either as they represent different perfections of the mind; or as they depict different areas of reality which the mind can explore. In the former case, it is the excellence of the mind, in terms of its deeper knowledge of causes, which is chiefly emphasized; in the latter, it is the excellence of the object, in terms of its greater removal from matter, which is the main consideration.

From the point of view of its own excellence, there are three speculative knowledges that perfect the human mind: *understanding*, or the habit of first principles of thought; *science*, which is knowledge that is certain with the certainty of proof—drawing its conclusions from principles that are either immediately or mediately evident—and which pushes its investigations to the last causes of things in a particular order of being; and *wisdom*, which also rests on proof, and which does not repose in its search until it reaches the last reasons of things in all orders of being. From this we can see, as St. Thomas says, that science is ultimate only in this or that genus of knowable objects; whereas wisdom is ultimate from all angles of vision, since it alone is last in all genera of knowledge.

From the standpoint of excellence of objects, or their degree of abstraction from matter, again there are three forms of knowledge that the mind can lay hold of: *physics*, which considers things that depend on matter and cannot be thought of without matter, for example, man, whose body is part of his essence and whose definition therefore must include the notion of matter; *mathematics*, which studies things that depend on matter for their existence but can be thought of without matter, for example, a curve which is capable of definition without reference to the material thing that is curved; *metaphysics*, which fixes its gaze on objects that do not depend on matter, either because they are never found in matter, for example, God; or because they can be conceived of without matter, for example, act and potency in creatures.

Physics for St. Thomas, therefore, is a form of philosophic knowledge. It is the philosophy of nature. By nature, here, is meant the world of being that moves through time and space and is endowed with properties and accidents that can be perceived by the senses. It embraces the cosmos in a general way, and man, in particular, as the crown of cosmic creatures. So we have *cosmology* and *psychology* as modern names for what Aquinas calls physics. And since this kind of knowledge is based on demonstration and does not give up its search until it grasps the last causes of cosmic beings in the particular order in which they are found—their inner nature or essence, their origin, their destiny—it can be truly called science.

Mathematics, too, in St. Thomas's system, is a form of philosophy. Indeed, it is the most certain of all our philosophic knowledges. It is concerned with quantity and the things that follow on quantity. Moreover, because of its certainty and the firmness with which it proves its conclusions, it is most rightfully called science.

Metaphysics is the highest and noblest form of philosophic knowledge, dealing, as it does, with being in its most abstract reaches and its farthest remove from matter. Here, again, some new terms have been coined to indicate the different approaches that mind makes to reality. Thus, the study of being as being is now known as *ontology;* and this is being under its most general aspects. In a more special manner, it also includes the being of truth, which is *epistemology;* and the being of God, which is *theology.* Now, it is obvious that metaphysics, because of its quest for the highest causes in all genera of knowable objects, is true wisdom: the kind of knowledge which St. Thomas calls the science of sciences. It further follows that sciences are many in number because of the different kinds of reality which they explore. Wisdom, on the other hand, is only one, since it considers everything from the over-all point of view of being: reaching down to the inert matter of the cosmos; rising through living creatures till it attains to the being of all beings, the First Cause and Ruler of all; stretching mightily from end to end, and placing everything in its proper order. Further than this, the natural light of reason is not able to go.

4. The Modern Meaning of Science

But is it not possible that we should have another form of knowledge that confirms the truth of its laws by proof, yet which does

not go so far as the natures or essences of things? Men working in the laboratory say yes; and they straightway point to physics (now taken in its modern connotation), chemistry, biology, and even psychology, as examples of what they mean by science: where the goal of investigation is not the nature of things as such, but the functions and structures which reveal that nature, as well as the uniform laws that govern it. Did not St. Thomas, however, study these very same things on his way to a philosophic knowledge of nature? The answer is yes and no. St. Thomas was interested in the way matter and men behave and how they are made, mainly because this kind of knowledge gave him the clue to their nature and essence. As a philosopher he was bound to look beyond the appearances of things. But his information about these appearances or *phenomena* was not gathered by the methods of modern science. Moreover, even when he stopped to dwell on such matters, he was more concerned to know and define them in their nature, or in their relation to nature, than to talk about them as pure phenomena.

In any event, the knowledge that Aquinas acquired about the acts and properties of things was not controlled or experimental, but only experiential. Also, as we shall stress again in a moment, it was not refined by the tools and skillful measuring devices that have been invented since his time, but was the result of what his naked senses could observe. To be sure, he could depend on the trustworthiness of his sense organs and the data of common experience, for that is all philosophy needs to establish its major truths. Were it otherwise, there could have been no true philosophic knowledge of man and his cosmos until tools and experimental methods had been brought into being—which is obviously untrue, since what Aristotle and Aquinas knew about cosmic things in their nature has been confirmed, again and again, both by the common insights of philosophers since their time, and by the special insights of the scientists. In order to show their differences more clearly, we shall call the science which is philosophic knowledge simply *philosophy.* That which is experimental knowledge we shall refer to as *science.* The contrast here is between the natural philosophy of Aquinas and the natural science of the moderns.

The first difference to be noted is in goals. Thus, science aims at what is peripheral. It goes round its object, so to speak, watching carefully how it acts, and viewing it from the standpoint of its

behavior and structural make-up. This leads to a knowledge of its accidents and of the stable laws that control its operations. Philosophy is central in its goal. It deals with the essence or substance of its object; or better, with the causes that lie at the bottom of that essence. In fine: both natural science and natural philosophy have the same material object; that is to say, they are concerned with the same subject, which is a being capable of moving through space and time and of making an impression on the senses. But whereas science confines itself to the surface, as it were, of its object, philosophy plunges within to grapple with its very heart and core. This is sometimes expressed in another way by saying that the major concern of science is with the cause which immediately precedes any given effect and which is the proximate reason of its being; while philosophy is bent on discovering the last in a series of natural causes, or the ultimate reason of any given effect. In short: although science and philosophy have the same material object, they differ in respect to their formal objects.

The second difference is in method which, as St. Thomas remarks, ought to correspond to the matter under investigation, and to the goal one has in mind. Now, what science is looking for is a precise and detailed knowledge of phenomena, since its laws are largely founded on such knowledge. It must find out all it can about the way its object is put together, part by part, and the way it acts. To secure such information it has devised the experimental or laboratory method of approach. This means that it can set the stage, so to speak, for its explorations. In doing so, it can also use the special tools it has created to give added power to the organs of sense. More than this, it can arrange the exact conditions under which its observations are made, so that these may be gone over again any number of times and predictions made as to their outcome. Philosophy, by contrast, does none of these things, for the reason that the data of common observation are enough on which to build its knowledge of last causes. It can trust the reports of the senses since these are basic sources of information in the economy of human knowledge.

The third difference flows from the second. Science, with its advantage of tools, has a special purview of reality which is not granted to philosophy. It is much the same as the difference between looking at a specimen of matter with the naked eye, and then poring over its details under the lens of a microscope. In both cases, one

makes an observation. Also, in both cases, one starts with experience resulting from contact of the organs of sense with objects that are able to be sensed. But what is common experience for the philosopher (since it can be shared by all men) becomes special experience for the scientist when the latter applies the tools of the laboratory to the matter he is studying. Now let us see how these distinctions work out in psychology.

5. *The Science and Philosophy of Psychology*

Psychology, as a form of philosophic knowledge, is as ancient as Aristotle. As a branch of science, it is as modern as Wundt. Both knowledges have the same subject matter or material object which is man. Both study him as a creature with matter in his make-up and bound by the same laws of time, space, and movement that are laid on all material things. They differ, however, in goals and methods. Thus, the goal of the science of human nature is to understand man in the manifestation of his properties and accidents; that of the philosophy of human nature, to grasp the meaning of man in his essence, or in the causes that lie at the roots of his being. The method of the former is that of experiment, where instruments are used to enlarge on the range of the experience which is yielded by the senses; that of the latter, is common observation, where knowledge is gained without the aid of tools, and without the benefit of any special or refined experience beyond that which the senses ordinarily reveal. All this we have said before; but it is worth repeating here, since it leads to some further remarks that must be kept in mind as we approach the study of psychology.

In the beginning of our book we mentioned that the method of science is mainly analytic; that of philosophy, synthetic. It is more common today to refer to these methods as inductive for science, and deductive for philosophy. There is no quarrel about such distinctions since they are true in a broad sort of way. At the same time, it must be remembered that the scientist makes use of deduction when he frames his general laws; just as the philosopher employs induction when he starts with the facts of experience. The latter can even use the findings of science as stock-in-hand from which to make his philosophic deductions. On the other hand, the scientist is not confined to the data of special experience in building his science. He, too, can and often does make use of matters of

common observation. This is especially true in psychology where it is necessary to avail oneself of introspection in order to complete one's knowledge of human nature. St. Thomas, as we shall see in later chapters, often makes observations that coincide exactly with the observations of the modern scientists.

Then there is the problem of the relationship of the science of psychology to the philosophy of psychology, in terms of the excellence of their principles. Here St. Thomas can help us. According to his teaching, one body of knowledge is subordinated to another when the latter gives the last reasons of those things about which the former treats. In this way, scientific psychology is ruled by philosophic psychology, since the philosophy of human nature shows why, in the last analysis, man is what he is and does what he does.

Moreover, since science has a goal distinct from that of philosophy, it is not the same kind of knowledge as the latter. Why? Because, though their subject matter may coincide, they can have different formal objects. Thus, the formal object of scientific psychology is man in his accidents and properties and the laws that regulate his behavior; whereas that of philosophic psychology is man in his nature and the laws that fix his being. Should anyone say that philosophy also studies properties and accidents, the answer has already been given: in scientific psychology a knowledge of the accidents and properties of man is the goal to which it tends; in philosophic psychology such knowledge is simply a means to the goal, which is a knowledge of the nature of man. Still, it is plain that science and philosophy are here related since man is the material object of both kinds of knowledge. It is also plain that one is subordinated to the other, since a knowledge of proximate reasons is ordered to a knowledge of ultimate reasons, when both knowledges deal with the same subject matter which is man.

Because of this subordination, certain ideas follow that are of capital importance to a right understanding of the fields of psychology. Thus, it is not the business of the scientific psychologist, as scientist, to study the last causes of man's nature. And since the soul is really the basic reason of man's being a man, it does not belong to the scientist, as such, to study the soul. In fact, he can write a whole treatise on psychology without ever mentioning the soul. On the other hand, it is not within his rights to challenge the findings of philosophic psychology when these latter are established, by

philosophic aspects are disclosed by the study of man in his essence, since a knowledge of his essence is the term of the philosophy of human nature. It is understood, moreover, that such knowledge includes causes that are outside man's essence, yet connected with it in the most intimate way. Such are: the cause that explains man's beginning or origin; and the cause that accounts for his end or destiny.

In the third place, in tracing back the meaning of man's acts and properties, general psychology does not rest at the level of either common or special experience, but seeks to determine the nature or essence of man, in terms of which the data of both common and special observation must find their final explanation. It is necessary to stress once more, then, that the philosophy as well as the science of human nature has its starting point in *experience.* Without that contact with reality, the former could be justly accused of being a cloud-born kind of knowledge—which is manifestly untrue, especially of St. Thomas's philosophy of human nature.

7. *The Value of Philosophic Psychology*

As a form of philosophic knowledge, psychology occupies a coign of vantage which St. Thomas was not slow to recognize.

First, as a part of the philosophy of nature, it studies the most important of all cosmic creatures: man. For man, as Aquinas would say, is a *microcosm,* or a whole universe in miniature. Knowing him, one comes to know better the nature of both animals and plants, since he is endowed with the same powers or properties that give these lower kinds of life their perfections as living organisms. His body, too, as body, has mass and weight, color and extension, and all the other properties of matter; so that in discerning what is corporeal in his nature, we can learn much about the nature of matter.

Again, psychology is of value as an introduction to metaphysics which is wisdom of the highest causes in all orders of being. Why? Because psychology studies the birth of the idea; and it tells us just how, from lowly beginnings on the level of sense, we can mount, step by step, to a knowledge of the loftiest reasons of things. In other words, to understand thoroughly the notion of cause, one must grasp the workings of the mind as it rises from the perceptions of

sense, through images, to concepts; broadening its mental horizons until it reaches the Reason of all reasons which is also the Cause of all causes.

Further, psychology lays the foundations on which the whole structure of man's natural moral life is laid. To prove this statement, it is enough to point to the doctrine of free will which is inseparably bound up with the problem of human obligation. Thus, it is idle to speak of norms of right conduct, or of the justice of rewards and punishments, unless the human will is free. But St. Thomas looks at the relationship between psychology and ethics in a more concrete way. He points to the former's discussion of man's powers; and particularly to its study of those perfections of powers that are called habits. Now virtue, which is of the very essence of man's moral life, is nothing more or less than a habit; that is to say, an acquired way of acting that contributes to his total well-being and keeps him on the path to the goal of final happiness.

Lastly, although he does not mention it, St. Thomas would surely agree as to the value of psychology for art—the other form of practical knowledge which is always contrasted with morals. For art, too, is a habit, the formation of which demands a knowledge of both sense powers and intellect; and the proper exercise of which calls for some knowledge of the passions and the regulating influence of will. All these, it need scarcely be said, are matters to be studied in detail by the philosopher of human nature.

8. *The Value of Scientific Psychology*

Broadly speaking, the science of human nature has the same value for the other branches of science as the philosophy of human nature has for the other branches of philosophy.

Thus, scientific psychology forms the groundwork of every science to the extent that it studies the laws underlying all our mental processes and makes test and trial of the best methods of learning.

Again, its splendid experiments on the formation of habits, its research on the physiology of the passions, its analysis of human abilities and of character traits, surely can have a meaning for ethics; just as its scientific knowledge of man's properties and outer behavior, when rightly understood, can give new insights into the particular areas of ethical science, where man is studied as a social and

political creature in need of a proper program of education if he is to unfold his powers to the fullest and arrive at that measure of happiness to which his nature entitles him.

Moreover, its findings in the fields of perception and imagery, where tones and colors, figures and backgrounds, and the elements of esthetic experience are studied with minute care, can be of obvious service to the fine arts; just as its scientific interest in the fundamental drives of human nature—to play, to be curious, to imitate, to be open to suggestion—as well as its focus on the factors of human personality, can be applied to the practical arts and even to business and industry.

Finally, the science of psychology reveals a wealth of new and interesting data to the philosopher who is looking for confirmation of his fundamental theses about human nature. And even in such cases where the data are not new, they often supply scientific examples for the illustration of philosophic truths. Last but not least, the findings of the laboratory furnish the alert philosopher with deeper insights into many facts and principles that he has hitherto known only in their surface aspects.

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BOOK ONE

VEGETATIVE LIFE

SECTION 1. THE SCIENCE OF THE ORGANISM

Chapter 3

THE NOTION OF ORGANIC LIFE

1. The Biology of the Organism

We start with life at its lowest level, the kind of existence that man shares with the plant. Because it is lowest does not mean that it is either uncomplicated or unworthy of our attention. Indeed, if man did not live first as a plant, that is to say, if he did not have the properties of vegetative life in his nature, he could not live at all. When, then, we use the word "life" in an unqualified manner, we refer to the manifestation of these most basic properties without which no creature on earth would be alive. It was with this idea in mind that Aristotle said: "For the living thing, to live is to be."

To the average person, life means *movement*, particularly the kind of movement where the cause of it is hidden from view. Such a test is simple and crude, of course; yet there is something to be said in favor of it. We know that the lightning which plunges in and out of the clouds, or the wind which sways the branches of a tree, is not living, because we are better informed than were our primitive ancestors about the nature of such things. But what one of us has not touched some tiny insect to see if it stirs and is really alive? Even things we know to be lifeless are sometimes described in a figurative way as living; because, as St. Thomas says, they seem to be set in motion of themselves. For instance, we speak of living waters when they flow from a source, but not when they are confined in a stagnant pool; or of quicksilver, which gives signs of having a sort of self-movement.

The scientist has more definite views on the subject. For him, life is *a mode of organization;* and, since we are speaking here of organic or vegetative life, it is that particular kind of organization which is

found in all protoplasm, manifesting itself through the possession of certain vital properties. These are: nutrition, growth, reproduction, and the power of making adaptive movements. For an object to be living in the biological sense, therefore, it must display all these features in greater or lesser organized form. Organization, in fact, is the keynote to the biologist's concept of life. As he looks at it, the life of an organism refers to the special arrangement of structures and functions that enable it to absorb food, enlarge upon its own substance, reach maturity, and then bring into being another specimen of living matter like itself, all the while fitting itself in a most marvelous way to the surroundings in which it happens to be. To accomplish these several objectives, two things are supposed in the protoplasmic system: first, a proper arrangement of parts or organs; secondly, the working of these parts in a way that is designed to bring about unity and simplicity. In order to get a clearer notion of what organic life means, let us select a typical cell and see how it is built and how it acts.

2. *The Structure of the Cell*

Man's body is made up of billions of building blocks called cells. An amoeba, by contrast, is simply one cell. Yet, the amoeba has everything necessary to its existence; and it lives, on its own plane, just as successfully as man. It breathes, though it has no lungs. It digests its food without the benefit of a stomach. It responds to stimuli, though it has no nervous system. It has no elaborate arrangement of muscles and tissues, though it does have specialized parts which are true organs for carrying on its life work and insuring its reproduction. The point I am making is that we can confine our research to a single cell, and still find therein all the essential features of man's vegetative life.

The physical basis of life is called protoplasm. It is a sticky jelly-like material, resembling the white of an egg. It forms the substance of the cell body and is surrounded by either a wall or a membrane. We may think of it as made up of two main constituents: cytoplasm, and a nucleus.

I. CYTOPLASM

The first thing to note about the cytoplasmic substance of the cell is the network or reticulum which gives it the general appearance

of a sponge and is therefore sometimes called *spongioplasm*. Enclosed within it are several open spaces known as *vacuoles*. These are of several sorts: air vacuoles, supplying oxygen to the cell; water or fluid vacuoles; food vacuoles, which hold nutritive elements that can be absorbed by the cell; excretory vacuoles which have the power of suddenly contracting and throwing out their contents. Also scattered throughout the reticulum are a number of small bodies known as *plastids*. These are thought to act as centers in radiating

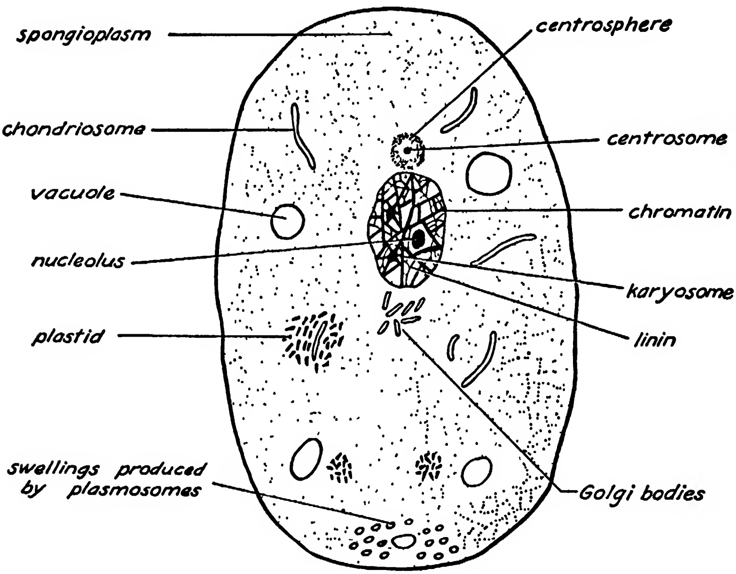

FIG. 1 A typical cell.

energy for the life work of the cell. When they contain coloring matter, they give the cell a special hue.

Chondriosomes are thread-like structures, quite constant in various kinds of cells. *Golgi bodies* look like a system of rods, lying close to the nucleus. These, along with the chondriosomes, are concerned with the growth and development of the cell. Another important organ lying close to the nucleus is the *centrosphere* or attraction center, with the small body in its middle known as the *centrosome*. Both have to do with reproduction; and where they are lacking, as in the nerve cells of a grown-up person, cell division does not take

place. The term *plasmasome* is reserved for certain substances that are invisible to the eye of the scientist, yet are presumed to exist because of the swellings that their metabolic wastes produce in the cell body. Finally, *paraplasmic substances* are not really part of the cell but are enclosed within its boundaries. They include such things as calcium particles, fat globules, matter that cannot be digested, and by-products of nutrition of which the cell has not yet rid itself.

II. NUCLEUS

On the inside of the cell there is a seemingly smaller cell called the *nucleus*. It too has a wall and a network. After a cell has been chemically treated we find that one part of this network stains and another does not. The former is known as *chromatin*, the latter as *linin*. The entire content of the nucleus is called nucleoplasm. A cell may not have any definitely outlined nucleus. In such cases the nuclear matter is scattered throughout the body of the cell in the form of granules.

On the inside of the nucleus a smaller structure is often found which is called the *nucleolus*. Its purpose is not exactly known, but since it disappears when the cell divides, it is thought to hold metabolic reserves for the reproductive process. When the cell is in the resting stage, that is, when reproduction is not taking place, the chromatin material appears as granules dispersed in strands throughout the linin network. But in the course of division these granules are arranged in a filament called a spireme, something like a string of beads. The particles composing the filament are given the name of *chromosomes*. They are definite in number for each species of living thing, for example, forty-eight in the case of man.

Each chromosome is really a packet of *genes*—particles of matter so minute that even the microscope does not reveal them. These latter are probably the most important elements of all protoplasm, because of the rôle they play in the transmission of hereditary characters. At certain places in the nucleus where the various strands of chromatin material cross one another, little net-knots or *karyosomes* sometimes form. They are not to be confused with nucleoli. Finally, we note the presence of small perforations in the nuclear wall which establish a direct relation between the nucleus and the cytoplasm, so that the living substance of the cell can be regarded as one physical continuum.

mechanical energy, heat, magnetic phenomena, and so forth. The unsettled state of the living organism is further shown by the ease with which slight changes in its surroundings destroy it and reduce its material contents to a nonreversible and unorganized mixture of substances.

IV. MAN'S BODY

Man's body is a mass of countless cells which have grown and developed from a single fertilized egg. It is made up of tissues and organs that are bathed in suitable fluids, protected by membranes, and supported by bones. These latter supply points of attachment for muscles as well as scaffolding and enclosure for vital organs. The brain, with its precious cortex, is the most delicate part of man's body. It is firmly cased in the cranium. The spinal cord is sheltered by vertebrae; and the nerves that run out into all parts of the body are sheathed in coverings. The heart and lungs are also hung within a hard firm framework of bone. The viscera are lodged in a large cavity below the lungs and comprise the stomach, intestines, liver, kidneys, spleen, pancreas, and reproductive glands.

All these arrangements of tissues and organs, woven into harmonious systems, are contained potentially—like the flower in a seed—in the single cell with which the body of man begins its earthly existence. Thus, by the time he is born, he is the possessor of an array of physiological devices that are almost unbelievably complicated. To carry on his nutritive activities and to help him reach maturity, he has the digestive, circulatory, respiratory, and excretory systems. To give him protection and support and to make possible local movement, he has the musculo-skeletal system. To secure the proper correlations in time and space that are necessary to a body so delicately balanced and so liable to be disturbed in one area or another, he has the nervous system. And, to add the final touch, all these finely-tempered organs and systems of organs have been brought to relative perfection and knit into biological unity before he is born!

3. *The Functions of the Cell*

The cell is not only the anatomical unit of protoplasm, but the source of vital activity as well. It can capture energy from the outside and, by the exercise of its own native powers, is able to use

this energy in a way that is decidedly peculiar to living substances. It nourishes itself, grows, reproduces, and adapts itself to the ever changing circumstances that the demands of life lay upon it.

I. METABOLISM

The cell is able to incorporate matter and energy from its environment and to make them serviceable for its vital movements. The entire procedure is known as *metabolism*. There are two cycles to the process. The first is anabolic, wherein energy-containing particles are taken in, worked over, and finally built up into the substance of the cell itself. The second is catabolic, in which part of the protoplasmic material of the cell is wasted through the breaking down of complex organic molecules into simpler compounds less rich in energy. The freeing of the potential forces of food is brought about by the application of oxygen to living protoplasm, in much the same way as the stored up energies of a lump of coal are released by burning it. The whole metabolic process is made possible by the extremely unstable chemical composition of the cell.

II. GROWTH AND DEVELOPMENT

Growth means increase in size and is the direct outcome of constructive metabolism. It derives its living character from the fact that, like the anabolic function, it is essentially *intussusceptive*. This means that the new particles of material which are deposited in the living substance of the cell actually become protoplasm and are not, therefore, mere mechanical additions to it. When the organism is young, the anabolic phase of metabolism is greater than the catabolic, and an increase in mass follows. In the mature organism there is more or less of an equilibrium established between the two phases, and mass remains at a relative standstill. During the senescent stages of life, catabolism slowly gains upon anabolism; with the result that there is a gradual wasting away of physical mass and a lowering of the rate of chemical activity. Natural death, in its physiological aspect, simply means the slowing down of metabolic processes beyond the point where waste matter can be discharged and the necessary exchange of energy made with the physical world.

Development is closely related to growth. It involves not only quantitative changes or increase in bulk, but also those processes that are concerned with the attainment of a definite organic struc-

ture. We might think of it, in a summary way, as growth plus specialization. Just what this means will appear more clearly when we speak of man's reproductive processes.

III. REPRODUCTION

Reproduction includes the whole sequence of events by which new living beings arise and the existence of the species is assured. The organism, as an individual, is subject to death and decay; and if the species is to be provided for, new individuals must be produced from materials supplied by the parent organism. It is often said that the major functions of protoplasm center around the contrasted activities of nutrition and reproduction. This does not imply that such functions are sharply circumscribed, but merely indicates the direction of different vital energies toward two particular ends: the preservation of the individual and the continuance of the species. Reproductive processes are either agamic or gamic.

Agamic reproduction appears in four major forms: *budding,* where cells are massed in certain parts of the organism, giving rise to buds that can reproduce the parent stock; *sporulation,* or the forming of tiny nucleated masses of protoplasm called spores; *amitosis,* where a cell divides into two by the simple cleavage of its cytoplasm and nucleus; and *mitosis,* which is the method followed by nature in the production of man's body from the original single cell that results from conception. Mitosis is also known as indirect cell division because there must be some previous preparation of chromatin material, as well as a special activity in the area of the centrosphere of the mother cell, before the stage is set for the birth of the daughter cells. At the moment of actual division, the spireme or string of chromatinic beads, is split lengthwise, giving rise to two fairly well defined groups of halved chromosomes. At the same time, the whole cell is seized by a convulsive movement that tosses its contents about in all directions, and separates it into two parts. What we now have, in reality, are two new cells, coming into existence upon the self-immolation of the original single cell. The drama is repeated thousands of times until, in the end, we have a complete, well-formed human body, ready to be born and to live its own life apart from the maternal womb.

The *gamic* modes of reproduction also presuppose the development of special living units called *gametes* or germ cells. Such, for

example, are the sperm and ovum in man and animals; and the male and female generative cells, produced by the pollen and ovule respectively, in the flowering plants. Although virgin-birth is a recognized fact of nature, gametes as a rule unite in pairs to form the one-celled organism known as a *zygote,* which in turn divides by the mitotic process which we have just described. The cells cling together, continue to grow and divide, and gradually specialize into organs and systems of organs until a complete body, able to exist by itself, is brought into being.

IV. ADAPTIVE MOVEMENTS

Adaptation refers to the structural and functional fitness which protoplasm manifests in making adjustments to its environment. Whether or not it possesses a nervous system, there is a natural tendency in every organism to react in a vital way to external stimuli. Such reactions are known as *tropisms;* and their presence is proof of the selective power of living matter to equip itself more perfectly for existence under the conditions of its surroundings. There is something almost instinctive about the way a sprouting seed sends its roots down into the soil and its stem upward, no matter in what position it is planted. The same sort of wisdom is observed in the turning of the leaves of a plant towards the light; or in the curving of its roots in the direction of water. Movements of this kind are all tropistic; and their obvious purpose is to enable the organism to make the best of its lot in life.

Protoplasm conforms to its environment in various ways. It is *irritable.* Even slight stimuli excite it. The intensity of response is often out of proportion to the amount of stimulus applied. By changes in form or motion, it is able to respond effectively to whatever the external or internal situation demands.

Again, protoplasm has a remarkable *power of preserving its integrity.* Like every other material body, it is subject to wear and tear. In order to live, it always has to be spending its vital energies, and must be ready at a moment's notice to cope with accidental injury. Such damages are made good by natural means. This remarkable phenomenon we call repair. Thus wounds heal up after a certain time, and wasted cells are generally replaced by new ones.

But even more astonishing, from the biological point of view, is the work of *regeneration,* where parts that have been entirely lost

are replaced, where an organ is reconstructed from a fragment of tissue, or where a whole living body is completed from what was originally only a portion of it—the sole condition being that each part which is to develop into a total organism contain a bit of nuclear material. Regeneration has been observed in plants and lower animals, but its powers are limited in the more perfect forms of life. This is due to the greater specialization of organs and structures in the higher animals, as well as to the more widespread division of their physiological processes, especially that of metabolism.

As a final feature of adaptation we should note the *unstable chemical structure* of protoplasm, which allows for an easy breakdown of its component parts, and a corresponding release of energy. This, in turn, prepares the way for new anabolic activities as fresh materials are taken into the body, or as recombinations are formed from the by-products of oxidation. The contrasted nature of some of these chemical reactions is interesting. Thus the plant, in its nutritive behavior, takes in carbon dioxide and gives off oxygen; while the animal turns the process in the opposite direction.

V. MAN'S VEGETATIVE ACTS

Three kinds of matter supply man with his vegetative needs: the food he eats; the air he breathes; and the fluids he secretes from his internal glands. Air furnishes him with oxygen for burning up tissues and unlocking the energies that he needs for physical work. His food, treated by various juices as it passes along the alimentary tract, is absorbed through the membranes of the intestines and carried throughout the body by the blood stream, into which the glands also pour their contents. These latter secretions are not only nutritive in value, but also have a stimulating influence on many vital functions. But the blood stream has done only part of its work when it brings food and oxygen to the hungry tissues. It must further help in the elimination of the waste matter that is left over from metabolism—discharging carbon dioxide as it goes back to the lungs, and other useless acids in its passage through the kidneys. Most of the fecal substances that are cast out in the alvine discharge have never really been in the body and so are not true by-products of metabolism.

Man's growth follows on his nutritive activities. At the one-celled stage of his existence, which is only momentary, there are no signs

whatever of the systematic development that his body will later show forth; yet, as we said before, it is all there in a potential way. After birth, and while he is young, the building-up forces of his body are more manifest than the breaking-down; and he increases his weight and stature. During middle age, these two phases of his metabolism are in relative balance. But when he is old, the seeds of decay begin to operate, catabolism overtakes and runs ahead of anabolism, and man finally dies when he can no longer withstand the inevitable laws of dissolution to which his nature is subject.

Long before his death, however, in fact while he is in the bloom of life, he can reproduce his kind and thus do his share towards the survival of the species. In its simplest terms, human reproduction means the uniting of sperm and egg, and the fusion of their nuclei to form a single cell. This implies that father and mother alike are reproduced in their offspring and that the latter is the sharer of two separate lines of ancestry. In its essential aspects, therefore, the generation of man is a purely vegetative act. But the added weight of sensation and feeling, of thought and idealized love with which it can be surrounded, makes it a tremendous affair; so much so that it can color his whole outlook on life, give rise to new standards of perfection and self-sacrifice, quicken his ambitions, and even have a bearing on his final salvation.

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SECTION 2. THE PHILOSOPHY OF THE ORGANISM

Chapter 4
THE DOCTRINE OF MATTER AND FORM

1. *The Nature of Physical Bodies*

For St. Thomas, the explanation of the nature of physical bodies is based on the matter-form teaching of Aristotle. Whether such bodies are living or nonliving makes no difference as far as the terms of the doctrine are concerned; for, it is designed by its broad philosophic outlines to include both. Aristotle taught that every corporeal substance, from the lowest mineral up to the highest living organism which is man, is made up of two principles that lie at the roots of its being: the one material and passive; the other formal and active. The relations that obtain between these two principles are those of natural complementation, since each is an incomplete substance; each is necessary to the other; and only when both are intimately knit together is the perfection of corporeal being, both living and nonliving, actually realized. Let us see how this conception of matter and form, explaining the nature or essence of every cosmic creature, took shape in the mind of Aristotle.

2. *The Notion of Accidental and Substantial Change*

Things are constantly altering their aspects around us. Such changes, of course, are merely accidental; for, even though they bring about differences in the thing involved, they do not affect its nature or essence. We might think of them, in general, as surface-changes. Most of them fall within range of the senses.

Aristotle distinguishes three kinds of accidental change. The first is *local motion*, easily perceived when bodies change from one point or place in space to another. The second is *change in quality*, like the variation of colors in nature. The third is growth and shrinkage

in the material mass of things, or *quantitative change.* All these different sorts of mutation have one factor in common, inasmuch as they fail to touch the inner nature of the thing involved. An orange, for example, can be moved about locally; it can change from green to yellow, sour to sweet; it can increase its bulk as it ripens. Yet, it remains the same throughout the whole series of movements, all of which are successive in time, and none of which make any difference to the nature of the fruit which continues to be an orange.

Substantial change, by contrast, is quite another story. Here we are dealing with a kind of event that penetrates to the core of the thing and makes it over into something entirely new. In this case it may be said that the thing simply is no longer what it was, but something else. The nature is changed. Thus, if the orange that we are holding in our hands were suddenly turned into a living breathing organism, we should regard the change as drastic. Yet this very thing, in point of fact, actually happens to it every time it is eaten and converted into protoplasm. Here we have a good example of substantial change which calls for a closer examination.

3. *The Philosophic Implications of Substantial Change*

When the orange is made over into living tissue, something obviously remains throughout the change; for, we can note the effects of the assimilative process, which is to provide nourishment and energy for the body. This permanent substrate, in the teaching of Aristotle, is called *prime matter.* But it is equally true that something is lost in the conversion, since the orange as such disappears; and what is left of it, namely, its material substrate, immediately acquires something new. What the orange loses, according to Aristotle, is its *substantial form;* and what its material substrate acquires is the substantial form of the organism. It is possible then, by a simple inference, to indicate the fundamental parts of which the substance of the orange is made up. They are: prime matter, the indeterminate but determinable principle which supplies the basis for the change-over from orange to protoplasm; and substantial form, the determining principle which accounts for the fact that the orange is the particular thing that it is and not something else.

Each of these two basic constituents, it should be noted, is substantial in nature; though neither, in itself, is a complete substance. To achieve completeness, prime matter must be joined to sub-

stantial form. Each principle, moreover, is real, even though its reality is arrived at by a deductive process. The very fact that the orange is able to nourish the body should be reasonable enough proof of the reality of prime matter, that is, of a permanent substrate which makes the conversion of substance possible. On the other hand, it is equally true that this same material substrate loses something real in the disappearance of the orange, just as it gains something real by metabolic conversion.

Further, when in the course of the change the substantial form of the orange disappears, its substrate immediately takes on a new form, which is that of protoplasm. Thus, there is no moment when the material substrate lacks a form, or when prime matter is without a principle of determination. But it is conjoined to only one form at a time. Its union with form is necessary because it is only part of the substance of any corporeal creature. For, it is plain that there is no such thing as half a substance or half a being. *Almost* an orange is out of the question.

4. *The Terms of the Matter-Form Doctrine*

From observations on substantial change of the sort we have just described, it is now possible to understand how the outlines of a vast matter-form doctrine, intended to explain the nature or essence of all physical bodies, should have occurred to Aristotle. To go over the main points of the doctrine again: every corporeal creature in the universe is made up of matter and form. By matter we mean prime matter or the material substrate that underlies everything. By form we mean substantial form or the principle that makes a thing what it actually is. Each of these two ultimate factors is not only substantial but real. Each is opponent by nature. Because of this opponency they are separable in thought, though never separated in fact. There is no such thing as matter without form; and with the exception of man's soul after death, as we shall see later on, there is no such thing as form without matter.

Prime matter in itself has no character. It is featureless, formless, indefinite, without quality, without quantity. What gives it definiteness, quality, character, what stamps it with quantity and makes it a particular thing, is substantial form. Hence, except for certain dispositions to be united with this or that kind of form, there are no

tially everything, though it is not actually anything. The thing that actualizes it and so brings into being a particular corporeal substance, is first or substantial form.

Such in outline are the essential features of the doctrine of matter and form, which St. Thomas prized so highly that he took it over without reservation and applied it, especially in its metaphysical aspects of potency and act, throughout all his writings. Its importance for psychology will be more plain later on when we see how Aquinas uses it to solve some of the critical issues about the nature of man.

5. *The Value of the Matter-Form Doctrine*

From the time of Aristotle down to our own, the doctrine of matter and form has made persistent claims for recognition in philosophic circles. Let us look briefly at some of the reasons why it has always gained such wide consideration.

First, it is based on facts of experience, beginning with the datum that one substance is changed into another. Further, it explains why all physical bodies have something in common, at the same time that they possess their own special properties. It should be pointed out, however, that neither prime matter nor substantial form fall under the perception of the senses. They represent contrasts that exceed the limits of our sense powers. We must rely on the truth of the mind and its judgments in forming an estimate of the Aristotelian teaching. It is not a scientific but a philosophic explanation of the nature of corporeal things, an interpretation of the data of observation in terms of the root principles that underlie such data. Moreover, it is based on concepts that reach down to the very bottom of physical nature by its proclamation of the philosophic ultimates of act or what a thing is, and potency or what a thing is able to become.

Psychology, all along the line, is in need of a great deal of unification; and it can do no harm to test out such a splendid conception of nature as the matter-form doctrine, by using it as a tool for appraising the findings of science. Though large in outline, it sets no limits to the kind of corporeal creature with which it deals. It is meant to explain the constitution of all grades of cosmic being, from mineral to man; and nowhere does the truth of its basic propositions strike home so forcefully (it seems to me as a psychologist) as in the case of the human biological unit! But wherever we apply it, the point to re-

member is its firm insistence on the composition of corporeal things —living as well as nonliving—of two essential principles: prime matter, the first subject of change; and substantial form, the first act or first perfection of matter.

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Chapter 5
THE NATURE OF ORGANIC LIFE

1. The Philosophic Notion of Life

Ask the philosopher what he means by organic life and you will likely be puzzled by his answer until you realize that what he says is applicable not only to life at the vegetative level, but to any conceivable kind of living being. Let us take St. Thomas as an example of this ultimate attitude. At the outset it should be noted that his whole point of view is a development from personal observations on the facts of organic life. Such facts, as he points out, are all basically concerned with the body of the organism precisely as a body: its birth through the generative power of the parent; its assured existence through the power of nutrition; and its gradual development to a state of maturity through the power of growth.

But, whereas the powers of nutrition and growth have to do with the organism itself, the reproductive faculty is given by nature in order to bring another organism into existence; and so it is the most noble and perfect of all our vegetative powers and the closest to the properties of animal life. This last remark is a case in point of how Aquinas sees final meanings in everything, because it illustrates a principle which he uses throughout all his psychological writings: "That which is highest in a lower nature approaches to that which is lowest in a higher nature."

Rising from observed data to a philosophic conception of life, Aquinas stresses three features of such vital acts as nutrition, growth, and reproduction. First, they are forms of movement; that is, of change from a condition of potency in which the organism is merely *able* to act, to a condition of achievement in which it successfully carries out the tasks that life imposes on it. Next, all vital acts pro-

ceed from the organism itself. This is obvious enough when we reflect that the living body has natural or inborn powers to absorb food, grow, and reproduce itself. Such properties are signs of the spontaneity of life. Finally, all vital acts have the effect of perfecting the agent from which they proceed. At any rate, this is their first effect, because it is only after the organism has secured and made private use, so to speak, of the things that are necessary to its own life, that it can transmit energy to other bodies. It is chiefly by virtue of this third quality, which he calls immanence, that Aquinas distinguishes between living and nonliving forms of movement. *Life, then, means any kind of spontaneous and immanent movement.*

Whatever philosophic attitude we adopt in attempting to explain the nature of the organism, there are certain generally recognized facts that every theorist must take into account. Each of these facts constitutes what we may call a primary datum of organic life. They are: the biological unity of the organism; the inner design of its processes; the flexible nature of its properties; and the coordination of its living energies with the closed mechanical system of the universe. Interpretations of life are usually grouped under two headings, according as they attach a mechanistic or a vitalistic meaning to the behavior of the organism.

2. *The Mechanistic Theories of Life*

Howsoever they may differ in form and exposition, mechanistic theories have certain ideas in common. All of them agree that vital phenomena are merely so many kinds of material energy—physical, chemical, electromagnetic, and so forth. Further, all agree that the postulate of a vital principle or special biotic force, to account for the organization of life, is an unwarranted because unnecessary assumption. But there are differences that make it possible for us to study the theories separately. We may distinguish three important types of mechanism.

I. ABSOLUTE MECHANISM

Absolute mechanism pictures the whole world of physical reality, both living and nonliving, as the result of the mutual interaction of the forces of matter. It says in so many words that all the processes of nature, without exception, are mechanically determined and capa-

ble of being explained by the laws of physics and chemistry. On this basis, then, organic life is simply the outcome of a power which is matter's birthright; that is to say, of a tendency that springs from its ontological roots and which belongs to it by its very nature. Félix Le Dantec, Charles Darwin, Thomas Huxley, Ernst Haeckel, and most of the evolutionary biologists who were prominent at the close of the nineteenth century, are associated with this extreme attitude. Among the present-day exponents of a thorough-going materialistic monism, John B. S. Haldane is perhaps the most noteworthy figure.

II. EMERGENT EVOLUTION

There is a more moderate form of mechanism which holds to the idea that life is a unique kind of activity, requiring for its description terms that transcend the naïve concepts of an absolute machine-theory. It is the point of view represented by C. Lloyd Morgan whose name was the first to be linked with the theory of emergent evolution. Morgan distinguishes in the events of nature between what he calls *resultants,* which are fully known when their components are known; and *emergents,* which are unpredictable even when the factors that enter into them are recognized. The latter are discoverable in nonliving matter; but they are particularly characteristic of life, which is an emergence from special complex collocations of chemicals. Even the human mind is included within the process, since it came into being when certain of these new modes of unpredictable relationship became highly enough organized to enable man to think.

The theory of emergent evolution has gained a wide following and marks a new point of departure for several other interesting theories, all of which seem to be of the same cloth. Thus, Henri Bergson's *élan vital,* Samuel Alexander's space-time matrix, Jan Smuts' whole-making principle, Alfred Whitehead's conception of the universe as a *totum organicum* of which the living organism is an exemplar, are so many differently shaded ways of expressing the same emergent idea. Moreover, in each theory it will be found, on close examination, that the lines of demarcation between matter-in-life and matter-outside-of-life are practically wiped out. There is no real distinction between emergence in the physical realm, and emergence in the biological and mental realms. And even though the

theorists deny the adequateness of purely physical and chemical laws to explain vital phenomena, yet they oppose any form of vitalism which refuses to accept the idea of life emerging from the inherent forces of matter.

III. THEISTIC MECHANISM

Theistic mechanism argues that matter may have derived its power to produce vital effects from an external source, specifically a Creator. This power could have been handed down from one organism to another. If such be the case, then living matter does not require any special principle or biotic force to account for its peculiar properties, since it has already received from the First Cause all the dispositions that enable it to live. Ulrich A. Hauber has recently defended views of this sort.

3. *Evaluation of the Mechanistic Theories of Life*

I. ABSOLUTE MECHANISM

One of the main difficulties in the way to an acceptance of any mechanistic theory is the internal design of all biological functions. Even if we were to agree with the view that organic life may be expressed in terms of the general laws of matter, there is still a distinction between living and nonliving matter which is not explained. It is not because of the special nature of its physical energies, nor because of its extraordinary chemical complexities, that living matter stands out in such clear contrast to the rest of the material universe, but rather because it employs all its forces toward the realization of an intrinsic end, which is the preservation of the total organism.

Even the simplest analysis of cell life reveals that no single function is independent of the whole system. It is the immanent manner in which these functions are related back to their point of origin, or their orientation towards the organism itself, that constitutes the real basic difference between matter-in-life and matter-outside-of-life. To say that matter-in-life has an innate power to self-adaptation means, in effect, that it is able to nourish itself, to grow and develop, and to reproduce after its kind; and further that all these particular ends are secured for the sake of an over-all purpose which concerns the organism as a whole. In matter-outside-of-life, on the other hand, there are no evidences of such inner finality.

II. EMERGENT EVOLUTION

Another weakness of mechanism, especially the revised form of it which is called emergent evolution, is its failure to fit in with the philosophic notion of causality. Every effect must have an adequate reason of being; and no effect can be out of proportion to the source from which it springs. It cannot, for example, exceed its cause, any more than the stone can be superior to the rock from which it is hewn. Now, let us suppose the essential correctness of Desiré Mercier's views in saying that "the chemical transformations that occur in living bodies are of the very same nature as those which take place in the laboratory; and the physical and mechanical properties manifested by living bodies are the same as those displayed by inorganic bodies." There is still the fact of immanence or intrinsic design, which is not accounted for by the terms of physical or chemical transformation. To say that life is a kind of emergence from inorganic matter, or that special collocations of nonliving substances made imperative the appearance of life, implies that a higher kind of structural and functional organization can emerge from a lower. Since a vital principle is denied, the only thing left to explain such emergence is the inherent power of matter.

The forces of matter, however, constantly tend in an outward direction, since their natural disposition is always to place their effects outside the subject from which they proceed. When sodium, for example, is united with chlorine to form salt, the whole focus of energizing is away from the individual elements and towards the new compound which is brought into being by their union. Vital functions, on the contrary, have a uniformly constant inner direction. St. Thomas expresses the difference very briefly when he says: "Action is of two sorts: one, which passes into outside matter, such as heating and cutting; the other, which remains in the agent, such as understanding, feeling, and willing. Their distinction arises from the fact that the former is not a perfection of the agent that moves but of the thing that is moved; whereas the latter is a perfection of the agent itself." Thus, in the example we gave a moment ago, the movements of sodium and chlorine are transient, as Aquinas would say, since their goal is something outside of each element. The

movement by which a living body assimilates its food, on the other hand, is immanent.

Now, the theory of emergence fails to recognize any such distinction between transient and immanent movement. By attributing to matter the power of readapting itself from extrinsic to intrinsic design of operation, it violates the law of causality because it supposes an effect which surpasses the known powers of matter; or because it predicts, without warrant, the emergence of a more perfect kind of existence such as is life, from a less perfect kind of existence such as is matter. If there were some reason for this prediction, the case would be different. But emergent evolution makes no provision, in the terms of its theory, for any life-giving agency, either outside or inside the organism, to account for the fact that it is actually living. At the same time that it invokes the laws of nature to explain the emergence of life through innate capacities in matter, it entirely disregards other natural laws that govern the constancy of relation between cause and effect.

III. THEISTIC MECHANISM

As a possible explanation of organic life, we can find no quarrel with the theistic theory of mechanism. To deny that it can occur would mean setting limits to the effectiveness of God's power in producing results that are perfectly within range of His action and influence. But looking at the problem from another angle, is it a scientific attitude to refer the explanation of organic life to an agency outside the living body when a more immediate cause for it may be discovered within the organism itself? Thus, according to the theistic theory, as it seems to me, living matter is distinct from nonliving matter only by the fact that God Himself is acting in the place of the principle of life and producing those effects that are peculiar to living matter. In other words, if the mechanical interpretation is out of question, there appears to be no alternative for the theistic mechanist except to assume an internal participation of the First Cause in the exercise of all biological functions. He does not admit, remember, the presence of a principle of life within the organism itself. Before we commit ourselves to such a view, the claims of vitalism should be carefully examined.

4. The Vitalistic Theories of Life

Vitalistic theories of life have always enjoyed a wide following. Though they vary a great deal in their description of the underlying causes of life, all vitalistic interpretations are agreed: first, that a purely mechanical account of living phenomena is inadequate; secondly, that some operational principle or biotic force, other than the physico-chemical forms of energy manifested by the organism, must be assumed if we are to explain the unity of structure and function in living matter. The need of admitting this new element arises from the fact that the properties of life cannot be understood within the framework of a purely mechanical system. In their efforts to deal with this plus factor, the vitalists have adopted different points of view.

I. THEORIES OF VITAL ENERGY

All theories of vital energy, as their name implies, put forth the idea of a special living energy or biotic force at work in the organism. All of them, too, are a direct challenge to the mechanistic conception of life.

One of the foremost exponents of such a view is Eugenio Rignano. Living matter, according to Rignano, is able to store up quantities of a peculiar kind of energy which it receives from its environment. This vital energy is broken down or separated into several qualitatively distinct forms, according to the needs of the organism. In the embryonic stages of life, the germ cells constitute a dynamic center from which definite amounts of biotic force radiate out to other cells in succession, directing the course of development which proceeds by a new formation of parts or organs, an unfolding of the original relatively simple mass of protoplasm in the egg. Moreover, whether we are dealing with a one-celled or a many-celled organism, its life exhibits a constant exchange of energies with its surround.

The same functional notion of life is found in Constantin von Monakow's *hormé,* a vital force in protoplasm endowed with the power of envisaging the future at the same time that it summarizes the past; in Charles McDougall's hormic activity, which explains life in terms of energy manifestation with a definite goal behind it:

matter and form. Entelechy is part of that concept, since it is identified with Aristotle's notion of substantial form: that which makes a thing what it is; and in the living body: that which is the source of its biological oneness, knitting together all its physical parts and harmonizing all its functions so as to achieve a unified whole. The organism, therefore, has two components that enter into its make-up: one, prime matter or material substrate; the other, substantial form or entelechy. Because it is a living body, we call its entelechy a vital principle, in order to indicate the source from which its life originates. While it is true to say, then, that every vital principle is an entelechy, it is false to say that every entelechy is a vital principle.

The principle of life is first and foremost entitative, that is, something which makes the organism *to be*. It is part of the essence of the living thing, the other part being prime matter. Yet, it is distinct from matter in the same way as substantial form is distinct from the substrate in which it is enmattered. But the principle of life is also a principle of operations. These it produces through its possession of certain powers which, on the vegetative level, are designed to nourish, develop, and reproduce the organism.

Aristotle's views on the nature and rôle of the vital principle in organic life were taken over by St. Thomas and made part of his own interpretation of the behavior of the organism. Thus, against the mechanists he declares: "To be a vital principle, or to be a living thing, does not belong to matter as such. Otherwise, all matter would be living." Against those theorists who speak of vital energies without going so far as to admit a vital principle or soul he says: "Though an organ may be a principle of life, as the heart is the principle of vital movement in an animal, yet nothing corporeal [either organs or energies displayed by organs] can be the first principle of life." And finally, in favor of Aristotle's point of view: "Therefore, the soul, which is the first principle of life, is not a body, but the act [that is, the first act or substantial form] of a body."

5. *Evaluation of the Vitalistic Theories of Life*

I. THEORIES OF VITAL ENERGY

Certain difficulties attach to all theories that involve vital energy or biotic force in their terms. First, if living reactions are properly

regarded as effects, not causes, of life, then it may be argued that the various forms of energy manifested by the organism are not self-directive, but depend for their reception and release upon some more ultimate principle which itself is not energy, but which controls the amount and disposition of such physical and chemical forces as are necessary to the life of the organism. Again, the facts of growth and development, as the organism gradually unfolds and advances to maturity, seem to establish beyond doubt the presence of peculiar forces in living bodies not discoverable in a purely mechanical system. But we still have to explain why such energies are unified and directed to a single goal, which is the formation of the complete organism. Finally, there must be some reason for the fact that the material forces of the universe are converted into vital energies. To say that an organism is alive because it functions in a vital manner is merely to restate the problem at issue. It is not to give the final reason for the living quality of such acts.

II. DRIESCH'S THEORY OF AN ENTELECHY OR FORMATIVE AGENT

Driesch's theory is founded on evidence which, like the classic work of Hans Spemann on embryos, is conclusive against the claims of mechanism. But I doubt very much that he had a genuine philosophic notion of Aristotle's entelechy. It is all well and good to say that there is something in the organism which "acts in a teleological, a *whole-making* way," and to call this formative or directive agent an entelechy. Such, however, is not the first and essential meaning of the word in the thought of Aristotle. To repeat what we have already said: the Aristotelian idea of entelechy refers to a principle or cause which is primarily entitative and secondarily active or operational. In short: the organism must *be* before it can behave; and its entelechy is the basic reason of its being.

Again, to speak of psychoids as vital agents is open to misunderstanding. On the face of it, such a statement is at loggerheads with the wonderful biological unity which the organism displays. To reconcile many vital agents—each following its own line of energizing—with the co-ordinated behavior of the organism, we must suppose with Aristotle that such agents are only proximate sources of life; that they are, in fine, merely powers of the living body, enabling it to use physical and chemical energies in different ways, according to its needs; but all to the end that it may arrive at the full

perfection to its being as an organism. From this point of view, a psychoid is simply a property that flows from the entelechy. Such a notion accords with St. Thomas's teaching that "not every vital principle is a soul," but only that principle which is the substantial form of the organism.

To sum up then: anything more than a single entelechy and anything less than a balanced arrangement of nutritive, augmentative, and reproductive powers rooted in the entelechy, is at variance with the philosophy of Aristotle—and more important still—with the biological unity which so clearly sets off the organism from other nonliving bodies. Thus, if Driesch's formative agent were also regarded as an informative principle, it could be made to fit in with Aristotle's idea of entelechy—provided it were clearly understood as the first act or substantial form of the organism.

III. ARISTOTLE'S THEORY OF A VITAL PRINCIPLE

The most satisfactory account yet made of organic life is found in the matter-form teaching of Aristotle. Starting with the fact of biological organization, it explains the oneness of the living body, as well as the singular harmony of its acts, by the presence of a soul or principle of life, distinct from the body at the same time that it is joined with it in a substantial union, and endowed with powers that enable the organism to nourish itself, grow, and generate. The grounds on which the teaching of Aristotle is founded are as follows:

A. *Biological unity.* Despite the differences of its material parts or organs, the living body manifests an orchestrated kind of behavior that is found nowhere else in nature. It moves, responds to stimuli, breathes, and feeds itself, carries on complicated chemical reactions, increases in size, and reproduces. The term of all these activities is: first, the organism, not something extrinsic to it; secondly, the whole organism, not any particular part of it. Oneness of purpose like this cannot be the outcome of a mere aggregation of material particles, such as molecules, atoms, protons, electrons, and so forth. Rather, it gives unmistakable evidence of a special kind of unity, biological in character, brought into being and maintained in the face of an amazing complexity of forces at play in protoplasm. Constancy of organization like this must have some cause behind it, since it cannot be accounted for in terms of its manifoldness.

B. *Intrinsic design of living functions.* When we say that nutrition and growth are vital acts, we do not mean to imply that all the physical and chemical processes involved in metabolism are living functions. It is obvious that changes in food material up to the actual incorporation of such particles into the protoplasmic system, represent transitive forms of energy. They are merely so many stages that prepare the way for assimilation. Thus, it is the change-over of food into living tissue, and the building up *from within* of new cells and tissues, that make both nutrition and growth such unique kinds of activity.

A simple comparison with the growth of a crystal will help to make the point more clear. When a crystal enlarges itself, it does so simply by a mechanical accumulation of one layer of crystal matter on another, starting with a nucleus and gradually extending outward. The intussusception of food, on the other hand, means turning matter that is lifeless into a totally different substance which is living. Again, the crystal in its formation liberates energy, whereas the organism is really storing up reserve forces as it grows. Finally, it is impossible to conceive of the crystal as having anything but accidental unity of structure, while the organism gives all the signs of being substantially one. Indeed, whether we view it with the naked eye, or study it under the microscope, the elements of the living body never appear disconnected; nor do they give the least hint that they have been brought together by chance, mere accretion, or any other accidental circumstance.

C. *The flexible nature of the properties of life.* One of the most remarkable features about the organism is its ability to restore damaged parts. If any area of the protoplasmic system is wounded, the whole organism exhibits a new mode of reaction. The normal course of metabolism is changed as vital energies are brought together in a single effort to heal the injured part. Other phenomena of regeneration, based on experimental evidence, reveal the flexible nature of organic life—as contrasted with the rigidness of the machine, and the one-track character of physical and chemical modes of action. From his studies of regeneration, Driesch concluded to the existence of a *harmonious equipotential system* in the organism. Thus, in the early embryonic stages of the sea urchin, each cell seems able to play all the rôles that are involved in its

complete development. The office that it actually exercises depends, as far as one can see, merely on its position; that is to say, on where it happens to be located in the system.

But what, it is asked, sets these equal potentialities into motion? Or, as St. Thomas would put the question: what reduces them to act? It cannot be anything from without; for, outside forces such as light, gravity, and so forth, have no effect on ontogenesis. Nor can it be due to chemical processes within the organism, since, as Driesch pointed out, only equilibrium or a new geometrical arrangement arises from chemical disintegration. Some nonmechanical factor must be present in the organism which is the cause, first, of the orderly nature of its potentialities; then, of the meaningful direction that these latter actually take. Aristotle's remarks about growth and attainment of suitable size can be applied here to the facts of regeneration. Thus, in the case of living bodies or "natural organized wholes, there is a limiting power that determines their size and increase. Further, such a balancing force is a manifestation of the soul [of the organism] . . . and belongs to the side of form rather than of matter."

D. *The law of conservation.* The law of conservation presents a difficulty that all vitalists must face. It expresses the idea that the total energy of a given material system, though capable of being transformed, is neither increased nor decreased by any action between the parts of the material system. But if the vital principle is the source of special forms of energy, how does such energy square with the law? The answer to the question is not hard to find if, in fairness to Aristotle, we make an effort to grasp what he means by a vital principle.

First, let us observe that the quantum of work done by the organism is precisely equal to the amount of material energy derived from its environment. The same idea may be expressed by saying that all energy incorporated into the body in the form of food, water, air, and so on, is eventually returned to the world of inert matter.

Next, we note that the rôle of the vital principle is simply to regulate the change-over of these energies from nonliving to living, that is, from a condition of being extrinsic in design to a condition of being intrinsic in design. Thus, the vital principle is able both to start movements and to hold them in line with an inner goal when,

for example, it impels the organism to seek its food, and distributes energy according to the needs of the living body. But its purpose always is to direct, not to create, the physical and chemical forces that it uses.

Finally, it must be remembered that howsoever we explain its action on the energies of the organism, the vital principle is not a foreign agent in the body, or something wedded to the latter only in an accidental way. This was what Plato taught. Much less, of course, is the vital principle something outside or above the order of nature. On the contrary, it is so natural to the organism that without it there would be no such thing as plant, animal, or man in existence.

6. *The Nature of the Vital Principle*

Aristotle defines the principle of life as *"the first act of a natural, organized, potentially alive body."* Three important ideas, each necessary to an understanding of his teaching, are contained in the terms of this definition.

I. FIRST ACT

The first act of a physical body is its substantial form. That the principle of life is the substantial form of the organism may be inferred from several angles: first, because it is the source of all those living properties and functions that mark the organism and separate it off clearly from nonliving bodies; secondly, because on its disappearance the whole nature of the organism is changed, its vital acts cease, and its contents are resolved back into the world of inert matter; thirdly, because the vital principle is that whereby the organism is primarily alive—the first act or first perfection by which it lives and performs all its vital operations. In fact, this first perfection is so all-embracing that by it—or by its union with prime matter—the organism is a substance, a body, and a living body, all in one. To distinguish it from the substantial forms of nonliving bodies, the substantial form of the organism is called a psyche or soul.

II. NATURAL ORGANIZED BODY

The body in which the vital principle is enmattered is both natural and organized. It is natural because, though made up of various elements, it is not a mere artificial collection of material par-

ticles, but something intimately one, presenting the aspect of a consistent whole. In short, it is truly a work of nature rather than an achievement of art or of mechanical perfection. Moreover, it is organized or composed of parts which, though different in structure and function, are drawn into the closest harmony and brought together by a single purpose which is the good of the entire organism.

In a special sense, then, the organism is a whole. As Cyril Joad remarks, it is really something more than the sum of its parts—which is the sort of unity that marks a machine. Rather, it must be understood as superior to its parts, "brought into being by their coming together, but not, therefore, to be resolved into them."

III. POTENTIALLY LIVING BODY

In Aristotle's definition, the body is referred to as potentially alive; because, until it is informed by a vital principle, it is merely capable of life. Thus the soul, as a substantial form, is united with prime matter to make a body; but because it is a living substantial form or a vital agent, it also makes a living body. When, then. Aristotle says that it is the act of a body which is potentially alive, he means that it is the act of matter disposed to live by the fact of its special organization. The matter in a stone, for example, is not so inclined. It is not organized in a way to produce the acts that are proper to life. It has no natural disposition, on the part of its material system, to nourish itself, grow, and reproduce. And so it is not potentially alive. Only a body that has such dispositions, by the special structure and arrangement of its parts or organs, is able to become a living body, by its union with a principle of life.

Here we are brought to the real distinction between living and nonliving bodies. Taking as our clue the Aristotelian axiom that the action of a thing follows its nature, we may draw up a comparison between matter-in-life and matter-outside-of-life.

First, in chemical changes that occur in bodies which are nonliving, for example, in the conversion of hydrogen and oxygen into water, prime matter is the constant, and substantial form is the variant, since the forms of hydrogen and oxygen disappear and the form of water comes to take their place. In vital changes, on the other hand—for instance, in the conversion of food into living tissue —prime matter is the variant, since it is constantly flowing in and

out of the organism; and soul or substantial form is the constant.

Again, both the organs and the acts of the organs in the living body have a unity and creativeness of purpose which is absent in a purely mechanical system. We can take a watch apart, study all its pieces, see how they fit into the pattern of the whole mechanism, then put them together again. The organism does not lend itself to such treatment. It is impossible to imagine how the watch, if out of gear, could set itself right; or, if broken, could mend itself. Much less can we imagine how any one of its parts could produce a new watch. Yet, living matter has the power of doing all these things.

Lastly, the most important of all the comparisons to be drawn between the functions of life and nonlife is based on the study of their respective designs. In the case of the former, it is *intrinsic* since the direction of the energizing of matter-in-life is inward, toward self-regulation and self-perfection. In the case of the latter, it is wholly *extrinsic*. Here we are striking at the deepest roots of the distinction of living and nonliving forms of energy—a difference which, as G. Barry O'Toole says, "does not consist in the possession or nonpossession of an entelechy, nor yet in the peculiar nature of the forces displayed in the execution of vital functions, but solely in the orientation of these forces towards an inner finality." This is what Aquinas means when he says that while nonliving bodies, by their natural forces, are able to preserve themselves in being, to add to their mass, and, by chemical combination, to produce other nonliving bodies, the living body accomplishes all these things "in a more perfect way," that is, by movements that are immanent and that have its own excellence as a primary goal. Thus, it preserves itself in being by nutrition; it adds to its mass by growth; and it produces other living bodies like itself by acts of generation.

As a final summing up of all the points we have made in this chapter about the difference between living and nonliving bodies, let us consult St. Thomas once more:

"The action of a vital principle is superior to that of a nature without life on two counts: first, in its manner of acting; secondly, in the effects it is able to produce.

"As to its manner of acting. . . . every operation of a vital principle must spring from an intrinsic source, since action of this sort is living—and a living thing is one that moves itself to act.

"As to its effects, first let us note that not every operation of a vital principle is superior to that of a nature without life. Thus, existence and all the things necessary to it, must be supposed in the case of nonliving as well as living bodies. However, with nonliving bodies, existence is conferred by an *extrinsic* agent. With living bodies, on the contrary, it is brought about by an *intrinsic* agent. Now, the acts to which the powers of the vegetative soul are directed belong to this second class. Thus, the power of reproduction is designed to give existence to the organism; the power of growth, to develop it to a proper size; the power of nutrition, to keep it in being. In non-living bodies, on the other hand, such effects [as their existence, increase in size, and preservation in being] are brought about by an agent that is entirely extrinsic."

In this passage from Aquinas, we have all the elements of his philosophic notion of life, gathered from his studies of it at its lowest level. To repeat and conclude: the behavior of an organism is a kind of movement, arising from a principle that is able to stir itself to action, and proceeding along lines that have the stamp of an internal design on them. And so life, in its most fundamental aspect, may be defined as a species of spontaneous and immanent movement.

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BOOK TWO

SENSITIVE LIFE

SECTION 1: THE SCIENCE OF SENSITIVE LIFE

Chapter 7
THE PROBLEM OF CONSCIOUSNESS

1. The Meaning of Consciousness

Consciousness is the most obvious feature that separates sensitive from vegetative life. It means, in effect, that wherever we find it, we are dealing with some kind of animal. The plant, on the other hand, gives no sign of being aware of what it does.

The notion of consciousness is hard to put in so many words. We know what it is from our experience of it; but giving a satisfactory definition of it is another matter. It comes from the Latin *conscire* which, in turn, is a shortened form of *cum alio scire;* and, according to St. Thomas, it means "the application of knowledge to something." He goes on to note that when it is considered simply as an act, that is, in its psychological aspect alone, it is what we call *consciousness.* But when it is further looked at from a moral angle, as something good or bad, it is known as *conscience.* Moreover, since consciousness is an act, it is always traceable to a particular power or set of powers. Thus, when I am looking at a friend, it is my visual power which is at work. If I am clasping his hand, listening to what he is saying, and reflecting on his good advice, then hearing, touch, and reason are also active. In short: there is no such thing as consciousness in the abstract. It is always the display of a particular brand of knowledge, coming from a particular kind of cognitive power.

The fact to keep in mind is that consciousness always implies a knowing subject along with an object known. But it also carries the idea of awareness of a special sort, since we are always conscious of something. Moreover, the awareness or knowledge here involved is tied up with the self or the supposit, since it is our own

personal feelings, perceptions, images, thoughts, and so forth, of which we are aware. To repeat: when I am conscious, it is always of some particular thing that is happening to me; and I cannot be conscious of this thing for somebody else.

But we are not conscious of everything with the same degree of clearness. From the outer world, I may be listening to a beautiful piece of music and only vaguely hear the clock strike. Within the regions of self, I may be following a certain line of thought with such rapt attention that I am only faintly aware of the cramp in my body. So we speak of consciousness being bright or dim; full or partial. We also refer to it as having a focus and a margin, a present and a past. By a strange paradox we even describe some of its levels as subconscious or unconscious. But in no case is it allowable to use the word without implying two things: first, knowledge of some kind; secondly, application of this knowledge to a particular object or a particular situation in our lives. Such, in any case, is St. Thomas's way of regarding it.

With this idea of consciousness as a cognitive event, go certain other features that ought to be stressed here. Thus, consciousness can be considered either as an act or as a content. Sensation, for instance, may mean the process of sensing or the product of the act. So, thought, too, can stand for the movement of thinking or the fruit of such reflection. The two examples also hint at another fact St. Thomas would be sure to bring to the fore at this point: that there is one form of consciousness which is purely sensitive and common to man and animal alike; and another that is intellectual and so proper to man alone. In this connection, and for the sake of clearness in the text, I shall reserve the word "mental" for man's intellectual processes. Here I am following the practise of Aquinas who says that only thinking creatures have "minds", in the strict sense of the term; because, by "mind," he means either an intellectual soul or an intellectual power. While the conscious life of the animal is never more than sensitive, therefore, that of man may be both sensitive and intellectual.

Again, consciousness is a vital thing. To use a figure of speech from the field of nutrition, it is like a metabolic process in which things are brought within range of our cognitive powers and transformed into objects of awareness, thus giving them, as St. Thomas teaches, a new kind of existence that they do not have in

their own right. Consciousness receives what the world has to give and then reacts. Though Aristotle uses the example of seal and wax to illustrate the point, it is far from bringing out the whole truth. For, impressions made on wax are dead things; while impressions made on consciousness are living and pulsating with energy. In the latter case, it is no mere passive witnessing of what goes on around the conscious agent, but rather an active realization of the powers and purposes of that agent.

Finally, though it shows itself in a wide range of functions, according to the pattern of the powers that exercise it, consciousness is really the experience of a single person; and so it tends to take on the oneness and whole-making quality of the subject in which it is rooted. This fact must never be lost sight of, even though for the sake of better understanding we break it down and study it piecemeal. The danger of distortion always threatens when we separate a living experience into its elements. We are prone to forget that it is alive and therefore real only when it is one and whole.

2. *Schools of Psychology*

Because of the critical part it plays in the lives of both man and the animal, the problem of consciousness supplies us with a point of departure for discussing the outlook of the modern psychologists. Thus, whether they accept or reject the facts of consciousness, they certainly have taken up a definite attitude towards them; so that, by starting with such events, we have a sort of scale for measuring the various systems that have found their way into the household of psychology. What follows, however, is offered rather as a further unfolding of the idea of *consciousness,* than as an adequate account of the schools of the moderns.

When, scarcely more than seventy-five years ago, psychology first put forward its claims as a natural science, it was generally held that the correct stock in trade for the psychologist is consciousness: its phenomena or appearances, its laws, conditions, and so forth. This point of view came to be abandoned in some circles. There were severe clashes of opinion on the matter, with unscientific elements entering into the debate. Still, when the dust of battle had settled, it was found that the greater number of psychologists were still clinging to the idea that consciousness is an object of scientific study. Let it be said at once that every school has contribu-

tions to its credit, apart from the system that it stands for; also, that many of the moderns today prefer to choose what they think is best from all the schools, rather than commit themselves to any one. Their outlook is synthetic, and this is a good sign; because it means they are approaching that larger vision of man as a whole, wherein the science and philosophy of human nature can be more easily reconciled and made to help each other.

To those who have closely followed the divergent lines of thought in modern psychology, the separation of one school from another is not as hard and fast as may seem at first glance. Thus, a man may not be so devoted to one system that he refuses to accept something from another. The headings I have given to the remaining sections of this chapter are names of *trends in the interpretation of psychological data*, rather than names of schools. If we think of the schools as "new blueprints of human nature" drawn up by the scientists, then the headings that follow might be used to correlate the blueprints, according as the trends are found to have some connection with one another.

3. *The Structural Approach*

The chemist speaks of matter as composed of molecules and atoms. The physicist pictures it as made up of protons and electrons. So the champions of *structural psychology* talk of consciousness in terms of its elements. These are sensations, images, and feelings; but most elemental of all are sensations. According to Edward Titchener, whose outlook was modelled on that of his master, Wilhelm Wundt, sensation is the immediate result of the impinging of a stimulus on a sense organ. Moreover, it is the only kind of conscious experience about whose basic simplicity we can be sure. But here Titchener seems to have stuck. To talk about sensation as the final atom of consciousness, corresponding to the simplest unit of physiological stimulation, and to say that all the rest of our conscious experiences are wrought out of these atoms, may be true up to a point. St. Thomas, for example, holds that all knowledge begins with sensation; and that all desire is based on knowledge. But, as he would have pointed out, the atomistic explanation of Titchener is hardly a full account of what happens when we perceive a thing with the interior senses, much less, when we think about it with the

intellect. It is like pulverizing consciousness into dust which can never be made whole and alive again.

In more recent times, the structural psychology of Titchener has found expression in the writings of Harry P. Weld and Albert C. Reid. It stems from the *content psychology* of Wundt and is in direct line of descent from the associationist theories of David Hume, James Mill, and Alexander Bain.

4. *The Functional Approach*

All psychologists today are concerned with functions, in one way or another, since the very nature of their science demands that they look to the acts and properties of a thing in order to discern the laws that rule it. In this sense, everybody might be called a functionalist. But *functional psychology* is the special name we give to that standpoint which regards consciousness as a series of acts rather than a set of contents. This fresh approach was begun in Germany by Carl Stumpf and grew out of his interest in music. It was taken up and continued in America by men like John Dewey, James R. Angell, Harvey A. Carr, and Glenn D. Higginson. Here, stress is laid on the usefulness of conscious phenomena in fitting man and animal to their surround; or on the rôle of such phenomena when the organism is confronted with a problem situation. The *dynamic psychology* of Robert S. Woodworth can also be considered as a branch on the widespread tree of functionalism. It studies the phenomena of consciousness as the to-and-fro action of causes and effects, with particular focus on the motives that are behind such manifestations.

Act psychology is an earlier form of this dynamic way of handling the facts of consciousness. It was given a place among the modern schools by Franz Brentano who taught that all consciousness has an intentional aspect, that is, an underlying relation to the objects that set it in movement. This bond between knowing subject and object known is a natural one and was remarked centuries ago by Aristotle. Indeed, since Brentano's training was in the tradition of the Stagirite, it is most likely that he borrowed his idea from the Greek philosopher.

Factor psychology is another school concerned with functions, but with the accent laid on the statistical findings that come to light

from long research in testing. Its founder and best-known figure is Charles Spearman. The goal is to find out what forces or conditions underly the actual performance of our conscious acts. The results have revealed the existence of both general and special abilities. The further problem is to discover the number, relationship, and organization of these abilities. As with Brentano, so with Spearman, there seems to have been some firsthand knowledge of both Aristotle and St. Thomas, especially in the matter of the traditional teaching on faculties.

One note, at least, is common to the foregoing schools: all are at pains to give the best account they can of the operational side of consciousness. In making this effort to delineate its acts, each system manages to add something to our understanding of what the mysteries of consciousness imply. At the same time, no psychologist seems averse to imposing his own meaning and order on the facts that arrest his attention. The upshot is that it is hard to find interpretations to which everybody gives consent. But *functional psychology,* as a whole, has made us its debtor on two scores: one, by supplying us with a better knowledge of the laws that lie at the bottom of adaptation, in general, and of learning, in particular; the other, by putting its finger on the basic purposiveness of conscious life.

5. *The Hormic Approach*

Mention of the word "purpose" in connection with the data of consciousness at once brings to mind the *hormic psychology* of William McDougall. To be sure, we are not dealing with a new phenomenon when we talk about purpose. It is a common topic in the psychology of Aristotle and St. Thomas; but McDougall has made his whole school revolve around the idea. The functional psychologist talks about purpose, too; but for him it is supplied by the situation in which the organism operates. McDougall, by contrast, holds that consciousness itself is goal-seeking; and thereby hangs the difference. The quality of *hormé* (from the Greek for *urge to act*) is not something we pick up as we go along in life. Rather it is born with us and shows itself in a wide range of tendencies, chief of which is that to be dominating and assertive, in one case; browbeaten and submissive, in another. Because of these two strains in our make-up, we are inclined to exhibit the features of

Here we find the motor aspects of our conduct heavily underlined. Consciousness is admitted in a roundabout way, its existence and importance hinging on the actual achievement of external reactions. This amounts to saying that it rates consideration only to the extent that it is transmuted into outer forms of behavior. The names of Knight Dunlap, Herbert S. Langfeld, and Edward L. Thorndike have been associated with theories of this kind.

On the credit side of the ledger, the behaviorists have furthered our knowledge of the bodily states that accompany consciousness. Without their painstaking researches, we might still be in the dark about many of the things that transpire in the deep somatic caverns of our make-up, when stimuli are applied to the body. They have also made it plain that we cannot begin the training of our children —moral as well as physical—at too early an age. It may well be that the grown-ups of the future will be more grateful to the behaviorists for their insights than are the grown-ups of the present. At the same time, we cannot overlook the fact that the whole behavioristic school is in debt to the original discoveries of Vladimir M. Bekhterev and Ivan P. Pavlov in the field of reflexology.

7. *The Pattern Approach*

Dissatisfied with the piecemeal view of experience that Wundt and his followers at home and abroad seemed so fond of, Max Wertheimer sought to give a more rounded and life-like outlook on the facts of consciousness by picturing them as perceptual wholes. This impression of having different sensations tied together into patterns had occurred to Aristotle. But Wertheimer came on it in a more controlled and scientific way, as a result of experiments he was making on seen motion. His findings were taken up by Wolgang Köhler, Kurt Koffka, and Kurt Lewin and worked over into a new system that is now known as *gestalt psychology.* Its followers believe in going back, for their data, to naïve experience where we find, not mere grouping of parts, but unified wholes: not masses of sensations, but awareness of trees, clouds, sunsets, and symphonies. Thus, conscious experience presents itself in the form of something organized. If it lacks an element, it tends to fill it in; if it is incomplete, it tends to close and complete itself. Looking at a group of lines, a patch of colors, or a series of partially related objects, we are prone to envision them as a unified pattern. This is the kind of experience that

psychology must explain; and the gestaltist attempts to do so with his theory of configurations. His school is opposed to the idea that the reactions of man and animal can be fully explained by stimulus-response bonds; and on this point he is at loggerheads with the behaviorist. He is also ready to champion the cause of introspection, even when it is simple and unconcerned about rules.

Like all other systems, gestalt psychology has come in for its share of rebuffs. And justly so in some cases, especially when it generalizes without warrant from the fields of physics and physiology to that of conscious experience and even beyond, to the realm of human personality and human society, fitting the selfsame pattern to everything. Logic alone would forbid such a procedure. How much more life, therefore! Yet, the hard won insights of the school have had their impact on other psychologists, by calling into debate some of the restrictions that have been growing unduly powerful in the science of human nature. Moreover, its vast programs of research are of the type that is leading us back to a more open-eyed and first-hand view of experience.

8. *The Drive Approach*

Another dynamic way of viewing the facts of consciousness is found in the *psychoanalytic psychology* of Sigmund Freud. The total field of awareness can be considered as having two levels: the first *unconscious,* made up of instinctive forces and racial memories which have only a vague shadowy form, as far as our knowledge of them is concerned; the second *conscious,* which has elements of both reason and will in it. Lump together the instincts with all their dark urges, and you have the Freudian *id.* Do the same with the operations of reason, and you get a fair idea of the Freudian *ego.* Set on top of all this the guiding movements of will, and it sums up, in a loose sort of fashion, the Freudian *super-ego.* All of which means that it is hard to set the language of analytic psychology within the framework of the traditional terms. Thus, instinct or *id* and its sphere of influence is broader in Freud than in Aristotle and Aquinas. Reason or *ego,* on the other hand, has a much more narrow scope. Will or *super-ego* is practically without counterpart in the psychology of the tradition. Its only rôle, seemingly, is to stand by and support the time-honored *mores* or customs into which we happen to be born. Moreover, in Freud's teaching, both the *ego* and the

super-ego have their roots in the *id*. This makes it possible for the unconscious to play a tremendous part—for weal or woe—in shaping our conscious lives. There is scarcely anything we do that does not have some connection with the unconscious. This is especially clear in the case of repressions; that is, experiences that have been disowned by the conscious and forced to dwell in the depths of the unconscious, where they entrench themselves and stoutly oppose all efforts to bring them back to actual experience. To aid in their re call, Freud worked out his elaborate method of psychoanalysis. It has proved very helpful in the treatment of certain kinds of nervous and mental disorders; and this alone—despite the flaws and errors in the Freudian interpretation of man's nature—calls for recognition. Among the moderns, however, many are unwilling to accept the Freudian psychology, on the grounds that it is not strict science. They allow that it is empirical; but not experimental. The Freudian answers that science is not exhausted by the experimental technique; that the method of the couch or the clinical approach is also scientific.

From the original psychoanalytic incubator of Freud, several other systems have been hatched. One is the *type psychology* of Carl Jung with its grouping of people into introverts and extroverts. Another is the *individual psychology* of Alfred Adler, which is built around the idea that the sense of physical and mental inadequacy is the most important single driving force in developing human personality. It should be noted that this sense of inadequacy, in Adler's system, is not an inferiority complex, though it may become one if not properly handled. A third system that has grown out of the Freudian school is the *will-force psychology* of Otto Rank. Here the conscious is thought of in terms of will instead of *ego* and *super-ego*. From it comes the psychic energy that is needed to fashion the individual's character and to enable him to steer his course between the pull of environmental forces, on the outside; and the blind urge of instincts, on the inside.

9. *A Note on All Schools*

At the beginning of this chapter, we remarked on the eclectic habit that appears to be growing among the moderns. Perhaps the best sign of this tendency is that nowadays we seldom hear of a man calling himself a structuralist or a behaviorist or a gestaltist as such,

even though the *isms* represented by such names are still talked about a great deal. It may be that the scientists are becoming tired or ashamed of having their work labelled by an attitude that is narrow at best—especially when compared with the broad outlook that the study of human nature demands. Aristotle once said that the human soul is *pos panta:* almost infinite in its possibilities! Now, human nature is the fruit of the soul's union with the body; so that it, too, is as measureless in the heights and depths of its native capacities. It is a good thing for the student, therefore, as he begins his study of conscious data, to have some idea of the different ways of looking at man. The schools have their shortcomings. Perhaps, with Edwin Boring, we may even say that they are no longer important as schools. Yet, they have widened out our perspective on human nature; and the good elements in them will eventually become the property of a unified science of psychology. True science, like true philosophy, simply outruns any school. Why? Because truth is one and undivided; and the discovery and exposition of it cannot be limited to a partial view, which is the outlook of particular schools. The partial view easily leads to partiality; and that is always dangerous in any form of human knowledge.

10. Traditional Approach

A system of philosophy, like a system of science, embraces a whole field of facts and principles on which it is founded. It takes for granted that the set of particulars with which it is concerned, when rightly understood, are proofs of the law and order that make it a system. Now *traditional psychology,* by its avowed search for final meanings, is ultimate in goal. But it is normative as well as philosophic, in the sense that it furnishes the tools for an evaluation of the work done by the scientific psychologist. As a way of interpreting human nature, it traces its beginning to Aristotle; and because its main doctrines have never been seriously challenged, it has a lawful claim to the title of *psychologia perennis.*

Consciousness, of course, it admits as a primary fact of life. But it does not limit it purview to the data of sense or the phenomena of feeling, much less to the orbit of outer behavior. Such things as thinking and willing also find a place in its outlook. Indeed, the thoughts and volitions of man are the very meat that sustain his life of mind; and since they are manifestations that flow from his nature

precisely as human, they furnish the grounds for everything else that can be said about his habits and person, his origin and end. Moreover, the soul of man is regarded as essentially different from his body, though the two are combined to form one human being; so that it must be made clear that the dualism which the traditional psychology holds fast to is not that of Plato or Descartes, but of Aristotle. This is the position which eschews the idea that man is pure matter, or pure mind, or an accidental binding together of the two. To repeat: for Aristotle, and after him, for St. Thomas, the only kind of union than the facts of experience allow for is a substantial one, where body and soul, or matter and mind, coalesce to make "this creature man." Because it is an approach to human nature through basic causes, traditional psychology has a vantage point from which it can survey the fruits of experiment and research—a position that enables it to witness and direct the final osmosis of the findings of science into the body of philosophy. As we said a moment ago, it has the critical tools for sifting the data of the laboratory and clinic; and so it is able to give such data a more basic coherence and a deeper meaning than science itself can achieve. At the same time, it has to square itself with what science discovers to be true about the acts and properties of man. As a matter of fact, Aristotle and St. Thomas would be the first to say that their psychology has no special value unless it can do just that—for the reason that it cannot be true if it fails to conform to the truthful insights of the moderns.

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Chapter 8

THE PHYSICAL BASIS OF CONSCIOUSNESS

Part I: THE STRUCTURE OF THE NERVOUS SYSTEM

1. The Neurone

Man's nervous system is the most delicate part of his body. Its task is twofold: to regulate his unconscious vegetative life; and to supply the organic basis of his acts of consciousness. The unit of the nervous system is called a *neurone.* The ancients spoke of man as a *microcosmos,* since he sums up in his nature all the outstanding properties of creation. In the same way, the neurone can be looked at as a whole nervous system in miniature. It has in-coming processes known as *dendrites,* because of their resemblance to the branches of a tree; then a *cell body,* with its nucleus and other living contents; and finally, a long out-going process which is called the *axone.* The bond of union between two neurones is referred to as a *synapse.* It enables the nerve current to pass from the axone of one cell to the dendrites of another.

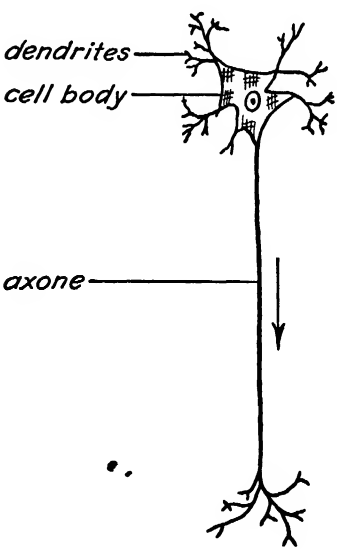

FIG. 2 A typical neurone.

Because there are billions of neurones in the nervous system, one might be led to think of them as tiny in size. This is true, as far as their diameters are concerned. But their axones can extend several feet in length: for example, from the brain to the bottom of the spinal

cord; or from the cord to the soles of the feet. What we commonly call *nerves* are, in reality, large bundles of axones, bound together by connective tissue, like the strands of wire in a cable. It has been estimated that as many as four million axones may enter into the structure of a single nerve!

As a working unit, the neurone has some remarkable properties. First of all, it is highly excitable—the most excitable kind of protoplasm, in fact. Thus, a very small stimulus can throw it into movement. When the amount of stimulation is just able to set off the nerve energy of the cell, it is referred to as a threshold. Upon increase, we observe a greater response on the part of the neurone. But a degree of intensity is finally reached, beyond which no difference in reaction can be noticed. In this case, we have reached what is technically known as a saturation point. Again, the neurone is able to conduct impulses through its whole system: from dendrites, to cell body, to axone. Since currents always pass in this direction, there is no back flow in their movements. Further, once a current is started by the application of a stimulus, it arouses the nerve cell over its maximum length. Finally, the neurone can convey impulses to another neurone. The transfer is brought about at the synapse. Each neurone, therefore, is a unit of conduction; and nerve pathways are made up of numbers of such units. By this arrangement, impulses are kept in their proper tracks. The actual nature of a nerve current, however, is unknown. It displays certain magnetic qualities; yet its speed—about a hundred meters per second in man —in no way compares with the speed of an electric current. The nerve impulse is thought to travel in undulatory fashion, rather than in a continuous line; so that in the intervals between currents, the cell is able to repair what has been wasted of its substance through the release of energy.

There are two major divisions in man's nervous system, corresponding to his needs as an animal and a plant: first, the *cerebro-spinal,* which controls his sensitive acts; secondly, the *autonomic,* which regulates his vegetative functions.

2. *The Cerebro-Spinal System*

The cerebro-spinal system has both a central and a peripheral area. The former embraces the *brain* and *spinal cord,* with the *medulla* acting as a link between the two. The latter connects this

whole central axis with the outlying areas of the body, by means of twelve pairs of *cranial nerves* and thirty-one pairs of *spinal nerves*.

The brain, of course, is the most important part of the nervous system for conscious life. It is made up of a *cerebrum* or large brain, and a *cerebellum* or small brain. The outer layer of gray matter, found in both these structures, is called the *cortex*. As far as we know, only the cortex of the cerebrum is associated with our acts of consciousness. It does not measure more than an eighth of an inch in thickness; yet it is composed of billions of cells, arranged in a fairly well outlined pattern, and hooked together by association fibers. A chart of the human brain, showing these countless lines of communication, would be more criss-crossed and netted than a diagram of all the telephone services in North America! But this, after all, is the kind of matter, so exquisitely wrought and finely balanced, that acts as the organic basis of mind. Without it, we should have no sensations or images; and since these, according to Aquinas, are the necessary forerunners of thought, without it we should be unable to acquire habits of science and wisdom!

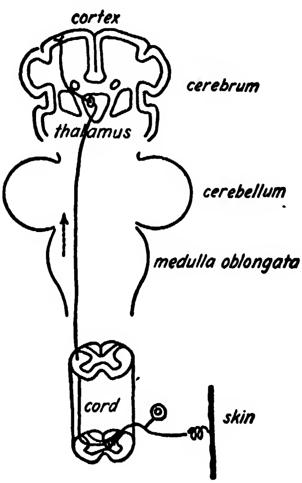

FIG. 3 A sectional view of the cerebro-spinal nervous system.

It is easy to see, then why scientists have given so much time to a study of the brain. More than a hundred years ago, Pierre Flourens published some findings on the subject from which he drew two conclusions: first, that the cortex of the brain is able to work as a whole, for the good of the organism as a whole; secondly, that within this total range of influence, certain areas of the cortex are set aside for distinctive functions. Other and more recent researches, such as those of Henry Head and Karl Lashley, bear out what Flourens taught.

The most interesting result of all this work, to be sure, is the association of our conscious acts with specific regions in the cortex. Assigning a place to this or that kind of experience, however, is not a hit-and-miss affair. On the contrary, it is the fruit of a wide assortment of skills: sectioning the brain after disease has attacked it;

For all of which we can be thankful: first, because we should never be able to manage our vegetative lives as well as the autonomic does the job; secondly, because with this load off our minds, we can devote our energies with greater profit to the cultivation of our higher faculties of sense and reason.

The autonomic system is well situated on both sides of the central axis of the body. It stretches from the base of brain to the end of the spinal column. The nerves that run out from its top and bottom parts are called cranial and sacral; and they form the *parasympathetic system.* Those that come from its middle area are known as thoracic-lumbar; and they make up the *sympathetic system.* Our smooth-muscled organs and glands usually are supplied with nerves from both systems; and since the very reason of being of the sympathetic is to act counterwise to the parasympathetic, this enables us to get opposite effects in the same organ or gland. Thus, the currents from one nerve will cause a quicker movement; those from another will hold it back. The effects of the sympathetic are general and diffuse. As Walter Cannon points out, they are like the action of the pedal on a piano which frees the entire keyboard and allows us to hear all the notes together. Those of the parasympathetic, on the other hand, are particular, and comparable to the sounding of keys individually when the pedal is not released.

Part II: THE FUNCTIONS OF THE NERVOUS SYSTEM

1. The Notion of Reflex

From a theoretic point of view, the working unit of the nervous system would be two nerve cells: one an afferent neurone, to carry in the impulse from a stimulus; the other an efferent neurone, to send the impulse back to a motor area. In actual practise, things are never so elemental as this—at least not in man and the higher animals. Each afferent cell is linked up with several efferent ones, and often with a number of connector cells that lie somewhere in the region of the cord. It is possible, however, that a nerve current starting from the outside, let us say on the surface of the skin, should run its course without reaching the cerebral cortex. This happens in the vertebrate dog, whose cord has been disconnected from its brain. Thus, when it is stimulated by a drop of acid applied to the side of its body, it responds with a clear scratching action. Here is a re-

flex, pure and simple; and it shows how even movements that are ordinarily accompanied by consciousness can sometimes go on in us without our being aware of them.

The reflex is defined by Walter Hunter as "a simple inherited mode of response controlled by the nervous system." It implies three things: first, a *stimulus* which is applied at some point outside the central nervous system; secondly, a *nerve mechanism* that embraces (a) a receptor, whose task is to pick up the effects of stimulation, (b) an adjustor, lying in the central nervous system, and composed of an afferent cell, several connector cells, and an efferent cell, and (c) an effector, which includes an out-going nerve-fiber, and the muscle or gland to which it is attached; thirdly, a *response*, which is the answer made by the nervous system to the impinging of the stimulus. The whole procedure, from start to finish, is both innate and involuntary.

2. *Special Features of the Reflex*

Charles Sherrington made some classic studies of the reflex, using the vertebrate dog as a subject. Among the many things that came to light, we note a *refractory period*, during which the reflex cannot be fully re-aroused because the nerve currents are blocked at the synapses and can cross over only at regular rhythmic intervals. This is rather fortunate for us, because it means that the small and unimportant stimuli that are constantly striking on the surface of the body are stopped from setting off our reflex processes. But it sometimes happens that two or more weak stimuli can fund their forces and start a current flowing. This is known as *summation*.

Another matter that Sherrington uncovered is the *latency period* which occurs between the applying of the stimulus and the appearance of the response. We know how fast a nerve current travels. We also know the length of arc over which it moves. Yet the estimate, on this basis, is always less than the actual time it takes to respond. How account for the difference? By adding the damper effect of the synapse. Again, if a stimulus is gradually made stronger, there is a broadening out of impulses over new motor pathways. This feature is called *spread*.

Finally, Sherrington noticed that *reflexes sometimes aid and sometimes hinder one another*. In the case of a block, however, the effect does not always arise from other reflexes, because the cerebral

cortex is also able to curb the behavior of the lower nerve centers. But a good example of inhibition that has nothing to do with the brain or conscious control is the right-of-way reflex. Here it is a question of safety first, where self-protection overrules everything else. Thus, to go back to Sherrington's dog, the righting reflex always had priority over the scratch reflex when the dog was pushed at the same time that it was tickled.

3. *Some Simple Reflexes*

The easiest way of approaching the functions of the nervous system, is to study them at the vegetative level. So let us look at the various systems of the body as they go about their tasks. Among the most primitive of our human reflexes are those connected with the circulatory system. Although the heart has its own fundamental beat, its action must be harmonized with the needs of the body at the moment—like fitting the proper gesture to the word. If we are in repose, it uses one speed; if under the pressure of emotion or a high expenditure of energy, as in a game of tennis, it must shift to another. The situation is saved by a series of cardiac reflexes. In the same way, the nervous system takes care of the regulation of blood pressure, by contracting and expanding the blood vessels.

Of primary importance, too, are the reflexes of the *respiratory system*. Here either the whole system may be called into play, as in the regular breathing in and out of air; or only parts of it, as in sneezing, laughing, crying, coughing, and yawning. Somewhere in between these types of behavior and the reflexes of the alimentary system is sniffing at food and other odorous things; and sucking, which follows from contact of the lips or tongue with a firm object.

In the *alimentary system*, there are any number of reflex movements, such as swallowing and vomiting; the secretion of saliva; the rhythmic contraction of the stomach walls, and the opening and closing of its sphincters as our food passes along; the secretion of gastric juices; and the wavy motion of the small intestines, known as peristalsis, which keeps their contents from coming to a standstill. This same kind of motion is also found in the large intestine and ends in defecation. Chief among the reflexes of the *excretory system* are the muscular movements of the bladder and ureter concerned with urination. Finally, we must note the reflexes of the *reproductive system* which comprise a whole series of acts that

bring about a swelling of the organs of generation, as well as rhythmic motion of the vasa deferentia, vagina, and other parts of the system, with their ensuing discharges; to which we may add the natural movements of childbirth since, up to a certain point, they too are reflex in nature. The various kinds of behavior that I mention here do not, of course, exhaust our list of reflexes. Perhaps it would give a better idea of our splendid endowment of tools for working at a vegetative level, were we to say that all the muscles in our bodies not under control of will, as well as all our secreting organs, such as the sweat gands, the thyroid, adrenals, and the rest, are under the dominion of reflex movements.

4. *The Conditioned Reflex*

Simple reflexes, such as those we have just been talking about, are gifts of nature. There is no need of cudgelling our brains to learn them, because they are well set up and going about their business even before we are born. But the moderns, and especially the behaviorists, speak a great deal of another kind of reflex which is not native but brought into being by the fulfillment of a number of conditions. Let us illustrate it by an example.

Suppose the skin is stimulated by a cube of ice at the same time that the odor of food is arousing a flow of saliva. After the two conditions have been linked together repeatedly, it is found that the touch of the ice cube will start a flow of saliva, even though the food is now absent. Here we have two simple reflexes, one causing a contraction of muscles in the skin, the other bringing about the secretion of a gland, with no original connection between them. But the arousal of both simultaneously for a considerable length of time has finally succeeded in binding them together into a unit of behavior. Pavlov was the first to make a careful study of the phenomenon; and he called it a conditioned reflex. We may describe it, in an academic way, as *an acquired response that was originally traced to one kind of stimulus,* A, *but is now the product of another,* B, *which has been presented several times to the organism in connection with* A. According to Pavlov, conditioning entails some action on the part of the cortex, since it is only on this higher level that new synaptic links can be formed between the arcs of simple reflexes. Thus, he found that with the removal of the brain from the animals on which he experimented, conditioning no longer took place.

Conditioning, to be sure, is as old as the human race. Pavlov did not discover it but merely made it a matter of special research with the precise tools of the laboratory. Our children are all subject to it, especially in the formation of their physiological habits. But it also reaches very deeply into the secret springs of our emotional behavior. The first flash of lightning or the first peal of thunder we experienced in infancy may have startled us; and perhaps no one did anything about changing our impression that here was a real threat to our lives. To this day, we may feel dread at the approach of a storm.

On the other hand, it is not too hard to start off a child with the right kind of responses, provided we give enough thought to the objects that arouse his emotions. At this early stage in his life, he is pliable and open to almost any sort of training, good or bad. The fact that he is able to form wrong habits, and that such undesirable things can be eliminated if caught in time, brings to attention another matter of capital importance: that *unconditioning* can mean just as much to the welfare of the child as conditioning. Here it is a problem of unlearning what ought not to have been learned in the first place. An experimental example will make the case clear. A child has been conditioned to be afraid of a fish in a bowl. The words "bite," "don't touch," and so forth, as well as withdrawing movements of the hands, have been used to bring about the emotional response. Now, to get rid of the fear, the bowl with the fish in it is placed on the table where the child is eating, but far enough away to let him feel secure. Then, day by day, the distance is lessened, until finally the bowl can be set quite close to the child, without arousing any noticeable reaction. He has gone through the necessary stages of unconditioning.

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Chapter 9
SENSATION

1. The Notion of Sensation

In order to see an object, light waves must impinge on the retina of the eye. The stimulus releases a nerve current which travels over the optic tract to a central area in the cortex. The end result of the procedure is the arousal of consciousness. We are made aware of the presence of the object, that is, we experience a visual sensation.

Suppose we are looking at a green light. The first stage in the sensation is the action of the stimulus on the cones of the retina. This is the *physical* phase of the process. It is followed by some sort of *chemical* reaction in the visual substances of the eye. Nerve impulses are set in motion and carried up to the brain. This is the *physiological* phase. Finally, by a living alchemy about which we know next to nothing, the nerve currents in the brain give rise to a conscious state and we have an awareness of the light. This is the *psychological* phase of the sensation; and while the other things that lead up to it are so many steps in its production, our actually being aware of the light is the fact of critical import to us.

Because in sensation we find the beginnings of all our highest mental achievements, St. Thomas gives a great deal of thought to it. His introspective findings have never been improved upon, even though science has added much to our stock of information about stimuli and physiological processes. Thus, I do not see any better because I know that light is a form of magnetic energy with a speed of thousands of miles per second. Neither does all the physiological lore in the world make clear how a nerve current is transformed from something nonconscious into a fact of knowledge or conscious-

ness. In short, sensation essentially is a psychological datum; and, as far as possible, should be described in psychological terms.

With this idea in mind, St. Thomas first makes a distinction between changes that are purely physical and those that are psychophysical. In the former case, the thing that causes the change is received, according to its own natural way of existing, in the thing changed: as the heat from a fire enters into the water that it heats. In the latter case, the thing that causes the change is received, according to a new and (for want of a better word) psychophysical way of existing, in the thing changed. Now, this is what happens when a stimulus is brought to bear on a sense organ. In fact, if the change were not of this kind, we should have no reason for saying that lifeless things do not experience sensations. Moreover, the impinging of the stimulus results in knowledge; and although consciousness is so simple and elemental that we are unable to frame a proper definition of it, the knowledge which follows on stimulation is a consciousness of some object. Finally, since nature has fitted us out with different sorts of sense organs for the obvious purpose of picking up impressions from different kinds of stimuli, sensation is always a particular kind of experience aroused by a particular kind of stimulus. We can sum up all the teaching of the Angelic Doctor by defining sensation as *a vital operation which follows on the stimulation of a sense organ by a proper object and which ends in knowledge.*

Let us examine our definition a little more closely. First, we notice that sensation is knowledge. This is the most important point of all, because knowledge is a distinctly new event among the many remarkable achievements of living things that we have already studied. To fall back on a common mode of speech, sensation is our natural way of "getting information"; and what is more true since, according to St. Thomas, the sense organ is in some manner impregnated by the *form* of the object that strikes on it! It is precisely this form, received into the sense, and bringing into being a living counterpart of itself, which enables us to know. Thus, we sense the color that we see, or the perfume that we smell, or the sound that we hear, because there is a re-production of these material qualities within our consciousness.

Again, sensation is a living operation. It is not, therefore, the mere passive response of an organ to a stimulus, such as would be

implied in Aristotle's example of wax receiving the impression of a seal. Of course, it is hard to illustrate a living movement except by another living movement. One might say that, just as an amoeba surrounds a particle of food, engulfs it, and makes it part of its own system, so the sense power is roused from its natural state of repose by the stimulus, grapples actively with it, and wrests from it a form by which it is able to know. Here is the real meaning of Aristotle's example; because it shows how one thing can impress another and, in the act of impressing, leave behind its form. Now, sensation is the result of the vital response of a sense organ to the action of a stimulus. It is nothing if not a living movement.

But the nature of the change wrought in the sense organ by the impression of a stimulus is still very obscure; and St. Thomas himself seems puzzled by it. It is not altogether physical because it does not pertain to the body alone. Neither is it entirely psychical, since it does not belong to the soul alone. Rather, it is the kind of change which is proper to a material organ whose source of life is also a source of consciousness. That is why I refer to the change as something psychophysical, since, as Aquinas says, it is neither wholly material, nor wholly immaterial. Like man himself, it shares in the nature of both body and soul.

Finally, we note that the thing which provokes a sensation is always the proper object of the sense aroused. Thus, in man and the higher animals, the senses are not all alike in the work they do. They are specialized for their respective tasks, and one cannot take over another's job. The eye, for example, is naturally built for the reception of light. It is not designed to respond to sound. In the same way, the other senses have their own special fields of operation, from which they make their reports to headquarters. A proper object, then, is one that by its very nature is meant to arouse a particular kind of sensation. But, as we said a moment ago, the sense organ, too, is so built that it does not normally respond to the action of a stimulus other than its proper one.

2. *The Analysis of Sensation*

In the daily experience of life, what goes on in consciousness is always a unified affair. One fact is related to another in much the same way as stone is related to stone in a finished building. There is nothing hanging in mid-air, so to speak, or out of line with the rest

3. *The Quality of Sensation*

Quality is the attribute that tells us what kind of sensation we are dealing with: for example, the experience of a red color; of a musical tone; of a pleasant odor; of a smooth surface, and so on. This qualitative aspect is due, in part, to the nature of the stimulus; in part, to the structure of the sense organ involved. Thus, a sensation of color is distinguished from one of sound on both these scores: because light waves differ from sound waves in their physical nature; and because the eye is one kind of neural mechanism and the ear another. Both mechanisms, moreover, have different centers in the brain where they terminate.

But is it not true that nerve currents are the same, no matter how aroused or what pathways they follow? And if this is so, why do we experience color as different from sound, or odor as different from pressure? According to Johannes Müller's theory of specific nerve energies, the reason is mainly because nerve currents have different terminal stations in the brain. In practise, it amounts to saying that the whole nerve apparatus, from sense organ to brain, is a unit in itself, different from other units, and capable of producing its own proper effects. How this happens may be better understood by the example from physics, where the same electric current is made to ring a bell, light a lamp, or heat a stove, all depending on the kind of device through which it passes. But the stimulus, too, surely is part of the picture and ought to be reckoned as a specifying factor in sensation. Still, Müller finds the clue to the mystery basically in the cortical centers, insisting that, if we could detach the optic and auditory tracks from their present moorings in the brain and make an exchange of their terminals, we would see thunder and hear lightning! Whatever the final explanation, it is certain that color has an effect on consciousness which is not the same as that of sound. And so with all the other qualitative differences of our sensations.

4. *The Intensity of Sensation*

Intensity is the attribute that tells us how much of a given sensation we are aware of. Because of its presence, we are able to say that one stimulus is stronger or weaker, brighter or duller, louder or fainter, than another. Here again, the differences are accounted for in terms of the force which the stimulus exerts, as well as of

the variations in the amounts of energy produced in the nerve tracks. These latter changes may be due, in turn, to the spread of impulses over many nerve fibers, or to multiple impulses in the same fibers, or to both factors. But whatever reasons we give from the physical or physiological side, as far as consciousness is concerned we are sure that our sensations show differences in intensity.

What has been called the Weber-Fechner law is an attempt to account for the connection between the strength of a stimulus and the quantitative changes in sensation that follow on it. It says that *a relatively equal increase of stimulus entails an absolutely equal increase in the intensity of sensation.* Thus, if a candle is introduced into a pitch-dark room, our awareness of it has a certain aspect of quantity about it. If another candle is brought in, there is double the amount of light. Now, a relatively equal increase of stimulus would mean that each time we add to it, we have twice as much light as before: 1, 2, 4, 8, 16 candle power, and so forth. Along with this geometric increase of stimulus goes an arithmetrical increase in the strength of our sensation: 1, 2, 3, 4, 5 degrees, and so on. Recent research would indicate that the Weber-Fechner law has an approximate value—except for very weak and very strong stimuli—in all fields except taste and smell. Its true psychological meaning might be expressed by saying that differences in the strength of our sensations, which we notice easily at low stimulation, seem to become unnoticeable at high stimulation. To return to our example: the increased effect on our consciousness when the second candle is brought in, is remarked at once. But the introduction of a seventeenth candle, when sixteen are already burning, would make little or no impression on the intensity of our visual sensation.

5. *The Duration of Sensation*

Duration is the attribute that gives sensation its temporal aspect. It stands for the length of time over which the experience endures. We are not talking now of the union of successive stimuli into a perceptual whole—as a series of sounds, for example, is combined into a pattern of melody or song; because this latter sort of experience properly belongs to a power that is more perfect than the external senses, as we shall see in our next chapter.

Rather, what is meant here is merely the continuance of sensation, due to the fact that the stimulus goes on striking the sense organ

without letup. We might conceive of this feature, as Titchener did, in terms of the rise, poise, and fall of processes in the nervous system. Certainly, without the persistent action of such processes, the sensation would fade and die out of consciousness. An interesting point is the question of changing successive stimuli into continuous sensations. Thus, a stimulus can be presented with intervals in between. But when these spacings become very small, they are no longer registered in consciousness as intervals. For example, experiment shows that waves of light, striking the retina oftener than five times a second, cannot be seen separately but turn into one unbroken visual sensation.

6. *The Object in Consciousness*

As already noted, the sequence of events that take place between the application of a stimulus and the response of consciousness is something about which we know very little. But it may make it easier to grasp the factors involved if we picture them as a set of steps rising from stimulus to consciousness: first, the action of our cosmic surround, or the movement of the stimulus as it comes in contact with the sense organ; next, the series of changes that occur within the nervous system as impulses are aroused and passed along from their point of origin to a central area in the brain; then the proper patterning of these impulses within the cortex as they prepare themselves for presentation at the doors of consciousness; finally, the sensation. Now, this does not really bridge the gap or pierce the mystery that separates stimulus from consciousness; but it is as much as we are able to say about the matter.

The thing to remember, as St. Thomas observes, is that sensation is a form of knowledge. It is due to a power of detaching the forms of objects from their matter; that is, of leaving their matter behind, so to speak, when their forms are given a new and psychophysical kind of being in consciousness. This stressing of form and its detachment from matter is all-important; because, for Aquinas, it is the secret of the whole knowledge process. It at once suggests another point. The Angelic Doctor never uses the word "stimulus" in talking about the problem of sensation. For him, it is always "object." And I should say that the difference between these two terms is the difference between the modern and the medieval outlook on the meaning of knowledge. Thus, a stimulus is a goad to physio-

logical action, like a spur put to the side of a horse. An object is a challenge to psychological action, like an insult thrown into a man's face. A stimulus is done with its work when it sets up a series of nerve currents. An object has failed of its task, as object, if it does not penetrate to the inner sanctuary of our consciousness. The stimulus is handmaiden to the object which, by means of it, is able to travel over the route laid down by nature for entrance into the precincts of knowledge. The written page that I am focusing on at this moment is an object of my vision; but it reaches my eyes and eventually enters the domain of consciousness only through the medium of light which is the stimulus of vision.

Aquinas groups all our sensations under five topical headings, each dealing with some particular feature of the cosmos in which we live. One group, embracing a wide range of experiences, is called *somesthesis* since it has to do with our body sensations. The other groups are concerned with objects that reach our consciousness through the avenues of *smell, taste, hearing,* and *vision.* We shall treat each group in the order mentioned.

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Chapter 10
BODY SENSATIONS

1. *The Skin*

Taken in the main, the sensations that arise from our bodies as objects of knowledge may be accounted for in terms of pressure, pain, warmth, and coolness, considered either one by one, or as a manifold. The sensible qualities of which we can become aware are the same as those ascribed by St. Thomas to *tactus*—a general name for the sense that makes us conscious of our own and other body properties.

The skin puts us in immediate contact with the material forces of our environment. Its outside face is exposed to the action of light, wind, wetness, dryness, heat, cold, and the numerous stresses and strains that one body exerts on another. Its inside face lies next to the fluids that bathe and protect the organs of the body. The skin is moist, supple, and able to stand a great deal of wear and tear. Its durability may be traced to the way it is built, layer on layer: first, the *epidermis,* which is hard and thorny; then the *dermis* or true skin, which is soft, spongy, and pliant. The cells that go into these two layers are always increasing themselves.

At the nostrils, mouth, anus, urethra, and vagina the skin is somewhat changed in structure to form the *mucosae* or membranes that cover the inner surfaces of the body. By this arrangement, we can have spaces on the inside which are really outside the body; just as the things contained in these spaces—food in the stomach, air in the lungs, urine in the bladder, and the growing child in the mother's womb—are also, strictly speaking, outside the body. Although the skin is impervious to the action of gas and water, the

mucosae of the lungs and intestines allow these and other nutritive materials to pass through freely.

The areas covered by the inner membranes of the body are enormous. For instance, if those that are laid over the small cavities of the lungs were drawn out flat and spread on the ground, they would measure over 500 square yards! So, too, the digestive surfaces are extraordinarily large. The human body, therefore, presents the aspect of a closed universe, bounded on one side by the skin, on

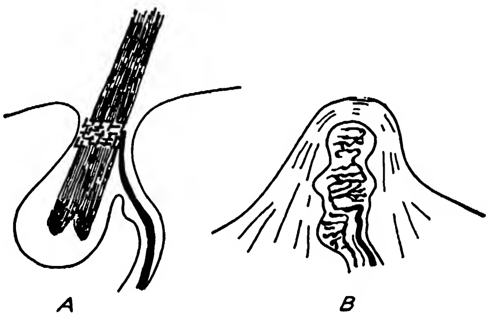

FIG. 4 Organs of touch. *A*, hair follicle; *B*, Meissner corpuscle.

the other by the *mucosae*. Throughout its whole mass, but especially on its outer surfaces, we find a profusion of tiny mechanisms, each a tactile sense organ and each, according to the way it is built up, able to record the changes in pressure, pain, warmth, and coolness to which the body is subject.

2. *Sensations of Touch or Pressure*

If a hair bristle of proper length and thickness is passed slowly over the skin, a number of spots are found where sensations of slight contact or pressure are experienced. The stimulus for this kind of reaction is any relatively weak force that is capable of distorting the skin. Usually it is a diminutive push of some sort, but a pull acts just as well. For example, if we give a gentle tug on a hair, the same conscious response is aroused as when we press on the skin. The organs for sensations of this type, in the hairy regions of the body, are the *hair follicles*. In other regions, it is thought that *Meissner corpuscles* act as receptors, though there may be additional organs,

too. The quality of our tactile experiences is rather hard to describe. If a hair on the skin is touched very lightly or a smooth surface is brushed with a feather, a weak ticklish sensation appears. It is only vaguely localized. If a stronger force is used, spots are found where a solid pressury quality shows itself. Anything in between these two tends to give us an experience of simple contact which is distinct though weak.

Touch discrimination is measured by the smallest distance between two pressure points that will yield distinct sensations when stimulated at the same time. Tested in this way, Ernst Weber found that the most sensitive areas on the outside of the body are the parts we constantly use: the tips of the fingers, palm of the hand, margin of the lips, and end of the tongue. In certain types of brain tumor and other disorders of the nervous system, the power to make fine distinctions of touch on the skin is greatly lowered and even lost altogether.

Aristotle was of the opinion that delicacy of touch is a clue to good intelligence. Commenting on this view, St. Thomas gives two reasons for such a connection. One is that touch is the most widespread of all our senses; so that anyone who has a highly refined power of touch should also have a nature with a proportionate degree of refinement. And other things being equal, this sensitiveness about things makes for better understanding. The other reason is that a sound and healthy sense of touch is an indication of good physiological complexion of body; and this would seem to be confirmed by what we said a moment ago about the loss of tactile discrimination when the nervous system is out of order.

3. *Sensations of Pain*

Now let us use a fine point, like that of a pin or needle, and press it moderately hard against the skin. At certain spots a sharp pain is felt, differing from touch in its tendency to arouse some kind of motor reaction. This is particularly true when we are unaware of what is going to happen to us. The stimulus may be almost any sort of thing that is able to penetrate the skin: a live spark, a drop of acid, the edge of a sharp tool, and so forth. Experiment shows that with mechanical stimuli, pressure usually precedes pain and fuses with it. This is due to the structure of the skin, the outer layer of which must be indented before it can be pierced.

The sense organs for cutaneous pain are *free nerve endings* in the skin. They alone are found in large enough numbers to correspond with the mass of pain spots that have been discovered on the surface of the body. Actually, no one has been able to make an exact count of these spots; but it is reckoned that the figure is somewhere between three and four million!

This is significant when we lay it beside the figure for touch spots which is in the neighborhood of half a million. It shows, among other things, that sensations of pain have more biological meaning for the body than those of touch or pressure. Delicacy of response to painful stimuli is greatest in the cornea of the eye and the exterior canal of the ear. The reason, of course, is because the tissues here are literally packed with free nerve endings. But sensations can be exquisite in other areas too, especially where the large nerves and blood vessels come close to the surface of the skin.

Our language is rich in its description of the quality of pain. It would seem to start at the level of itch, then mount upwards through prickling sensations, until it reaches its peak in clear and unadulterated pain. This sliding scale of changes may be due, in part, to the strength of the stimulus; in part, to the place where it happens to be applied. From the standpoint of our conscious attitude, we find that painful experiences can be either pleasant or unpleasant. Thus, the itch of a healing wound, the prick of spice on the tongue, or the stab of pain that comes from wiggling a loose tooth back and forth, are things that may be actually enjoyed by some people. On the other hand, the sharp violence of the sting of a bee, or the insistent clamoring of a burn on the skin, is scarcely a source of pleasure!

4. Sensations of Coolness and Warmth

If a blunt metal point whose temperature is a few degrees lower than that of the skin is touched to the body, certain spots react with a sensation of coolness; and, when they are carefully marked, these spots are found to call forth the same kind of experience every time they are stimulated. If the temperature of the tool is raised somewhat, other points are noticed that yield a sensation of warmth. Reactions of this kind, however, do not depend on any absolute temperature in the stimulus, but rather on one that is relative to the temperature of the skin. Hence, if an object causes the withdrawal

of heat, it is felt as cool. When, on the contrary, it adds to the heat of the skin, it is felt as warm. Our thermal senses, like those of touch and pain, usually work under short range.

The stimulus for all experiences of this kind is a change in the temperature of the skin. In order to get some uniform way of reckoning the matter, the surface of the body is considered first in a state of indifference to temperature. This is the situation where things are experienced as neither warm nor cool. We call it physiological zero; and it varies for different parts of the body, and even for the same parts at different times. Suppose that we are resting in a room of 70 degrees Fahrenheit. Then, physiological zero is 98.6 under the tongue; around 95 on the clothed surfaces of the body; 91 on the hands and face; and 78 on the ear lobes. These are average figures; but they give a fair idea of how the zero mark differs. They also enable us to add to what we said above about the relativity of the stimulus: objects above physiological zero arouse sensations of warmth; those below it produce sensations of coolness. This is the ordinary rule. Yet, by a quirk of nature, a stimulus with a temperature above physiological zero sometimes provokes a sensation of coolness. Thus, with our backs to the fire on a cold winter's day, we often feel chills running up and down the spine. The heat has somehow managed to stimulate the cool spots.

The organs that mediate our sensations of warmth and coolness are still unknown. But the likeliest structures, because of their abundance everywhere, are *free nerve endings* in the skin; so these may be presumed to be the tools by which we pick up stimuli. As to the quality of our thermal experiences, one cool seems much the same as another; and so with the warms. Cold and hot have an added element of pain, so it is thought. The spots where sensations of temperature can be aroused are fairly numerous, with a spread over the whole surface of the body: for warmth, about 125,000; for coolness, in the neighborhood of 16,000.

5. *Sensations of Movement*

The parts of the body that are concerned with motor behavior have been studied with great care and precision by the physiologists. They embrace the muscles, tendons, and joints. Here we have all the elements needed to achieve a wide series of movements, ranging all the way from the simple lifting of a finger to the most

tendons. The stimulus for sensations at the joints is any force that can exert pressure on the particular surfaces. The quality of the reaction may be one of smooth pressure, as when we use a joint that is seldom moved, for example, the first joint of a finger or any joint of the toes; or it may be aching or acutely painful. The sense organs are *free nerve endings* and *Pacini corpuscles.* Before bringing the matter of kinesthesis to a close, it should be noted that experiences of ache and pain, in muscles and tendons as well as joints, can take their origin from stimuli that are already existent in the body, such as poisonous or other chemical substances that gather in these areas.

6. Sensations of Balance

Our experiences of balance have to do with the body as a whole and its welfare. Thus when at rest, we are aware of one sort of sensation which may be called static. When in motion, on the other hand, the sensation is somewhat different; and we shall refer to it as dynamic. In both cases we are able to maintain ourselves on neutral ground, so to say, between forces that might throw us about in an unseemly fashion, and so cause us to lose our tempers and virtue as well as our poise and dignity.

A. *Static equilibrium.* To understand how nature has provided us with a means of keeping our balance, we must examine the inner ear. It is made up of two sectors: a cochlear part, which is concerned with hearing; and a vestibular part, whose task is to mediate our sensations of equilibrium. Now, the organs that take care of our problems of balance when the body is at rest are found in the lining of the utricle and saccule. This lining is known as the *macula acustica.* It is built up of column-shaped cells, each of which has a set of bristles that project from its free end. Scattered among the hairlets are small concretions of calcium carbonate, known as ear sand. Since the work of the macula is to let us know when the body is on or off its ordinary vertical position, it must be adequately aroused. The stimulus is furnished from afar by the force of gravity which is constant, but immediately by the push or pull of the grains of ear sand on the hairlets of the cells. This tugging motion affects the hairlets in one way when the head is erect, in another when it is bent or at an angle to the vertical. The nerves lying at the deep ends of the hair cells are differently stimulated according to the

different positions of the head. The currents thus set up make their way, over the vestibular section of the auditory nerve, to the proper brain centers; and through the sensations that follow, we are able to recognize the actual posture of the body when at rest: if erect; or prone; or half reclining, and so forth.

B. *Dynamic equilibrium.* To get a clear idea of the meaning of balance when the body is in motion we must continue our study of the inner ear. Springing from the utricle, we notice three semicircular canals. They are so arranged that they lie at right angles to one another—a device that makes it possible for us to record movements in all directions. Each canal has a bulge at one end, called an ampulla because of its vague resemblance to a jar or flask. On the inside of each ampulla is a lining, much the same as that found in the *macula acustica.* But in this case it is known as the *crista acustica;* and now that we have these two anatomical parts of the ear together, we may say that neither has anything to do with acoustics or hearing—the names going back to a time when it was thought they did. The only difference that we can find between the *macula* and *crista* is the absence of the calcium carbonate particles among the hairlets of the latter. How, then, is it roused to action, or what sets off the nerve currents in its nerve endings? The answer is: the *endolymph.* This is a watery fluid that circulates freely through the membranous passages of the whole inner ear; and its flow follows the movements of the head. With two ears and two sets of semicircular canals, any increase of fluid pressure in one ampulla brings about a lowering of pressure in the corresponding ampulla of the other ear. For balance when the body is at rest, therefore, it is enough to have the force of gravity, exerting its pull on the calcareous particles of the *macula.* When the body is in motion, however, the flow of endolymph is needed before the nerve endings, embedded at the base of the hairlet cells of the *crista,* can be stimulated. The currents thus aroused, like those in the *macula,*

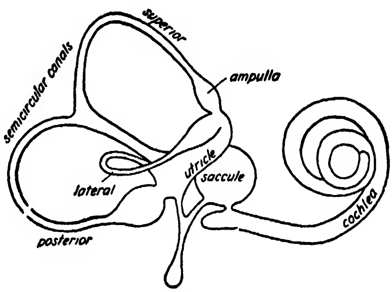

FIG. 5 Membranous labyrinth of the inner ear. The vestibular section comprises the utricle, saccule, and semicircular canals.

also run out over fibers that connect with the vestibular section of the auditory track. When they reach their proper centers in the brain, we are straightway made aware of the condition of balance—or lack of it—in our bodies.

Once we have learned to walk and run, our sensations of equilibrium are such ordinary things that we scarcely take notice of them. But if the head is shaken vigorously, or if the body is spun around for a time, we can become acutely aware of the loss of balance. Experiences of this sort can persist for hours after the body movements have stopped. How this comes about is explained by a simple experiment. If a few particles of cork are scattered on the surface of a tumbler of water and made to rotate, they will continue to go round even after the tumbler is set down. So, if the head is moved energetically from side to side, or back and forth, or up and down, and if this is prolonged for some time, there is always a movement of fluid in a corresponding canal to keep pace with it, and to carry on after the head is at rest. As long as the endolymph is active, therefore, we have stimulation of the nerves that lie at the base of the hairlet cells in the *crista.*

But in addition to the signals that we receive from the *macula* and *crista,* it is plain that other senses, too, add their clues as to the position of the body. This is particularly true of the information that comes from vision, touch, and the muscular senses, all of which can aid and abet the messages that are sent from the inner ear. Thus, it would be extremely difficult for people like ballet dancers, tight rope walkers, and sailors to keep their poise if they had to depend solely on the sensations that arise from the movement of endolymph. In cases such as these, the amount of stimulation that the hair cells of the *crista* undergo must be almost violent at times—in comparison with what the ordinary person experiences. All of which proves that there is practically no end to the way a man can change his outer behavior when a new situation demands it.

7. *Organic Sensations*

Our organic experiences come from stimulation of senses that lie in the internal organs of the body. We can group them under five convenient headings: needs; satisfactions; fatigues; illnesses; well-being. Our plan of treatment here follows the order of Luigi Luciani who gives us the classical treatment of these matters.

I. BODY NEEDS

The wants of the body give rise to a number of sensations, all of which seem to have one thing in common: the element of urgency. It is not a case of putting off till tomorrow what cannot be done today. Rather, the impression is of a situation that has to be taken care of here and now. True, one need does not have the same intensity as another; but all of them, as physiological urges, have the power of becoming very strong and persuasive in consciousness.

Hunger, of course, is the most fundamental drive of our nature, since its goal is the survival of the individual. As a sensation, it is aroused by contraction of the stomach walls. The experience is one of gnawing, accompanied by dull ache. It is due to the presence of special physical and chemical conditions, since gastric movements go on even during the digestion of our food. Appetite, it should be noted, is a form of food-seeking that can exist apart from the pangs of hunger. It depends, in large measure, on pleasant experiences we have had in the past. Thus, if bread and meat and vegetables are the usual objects of the hunger drive, dessert might well stand for the goal of appetite. As we shall see later on, the word "appetite" has another meaning in the traditional psychology, more important than that of a mere attitude toward good things to eat.

Thirst is a manifold of several qualities; but it is made up, in the main, of sensations of heat and dryness in the throat and mouth. It is a direct result of reducing the moisture in the body tissues, particularly those of the pharynx. The lowering of water content, in turn, may be brought on by a number of causes, such as strenuous exercise; warm weather; the eating of foods, like spices, salt, beans, and so forth, that have a tendency to extract water from the system. Whether mild or intense, the feeling tones of thirst are not of a pleasant nature.

Erotic experience, looked at simply as a matter of sensation, is aroused by the various states of swelling in the reproductive organs, as well as by the discharges of glands which go along with excitement in the genital areas. The quality of the experience is also a manifold of reactions of the same sort as those that arise from the skin: touch, pressure, tickle, and so on. The difficulty in making an analysis here comes from the confused way in which erotic sensa-

tions are conjoined with erotic emotions. This will appear in a clearer light in a later chapter; but at this point we can say that sensation is a matter of knowledge; while emotion belongs to the field of desire or orexis.

The *need to urinate* is linked up with sensations that arise from a condition of pressure in the bladder; just as the *need to defecate* is associated with pressure in the large intestine. As a special condition of mothers, the *need to lactate* takes its origin from the pressure of milk within the breast. The *need of air* gives rise to sensations of suffocation that are particularly distressing in their effect on consciousness. They are likely due to a disorder in our breathing apparatus, rather than to lack of oxygen or excess of carbon dioxide in the blood stream. Finally, the *need of change* is another set of hard-to-analyze sensations that often go under the name of nervousness. Sometimes it is short-lived, as in the case where organic needs are aroused at a time when they cannot be satisfied. But again, it may be a more or less permanent condition, due to enforced idleness; or, at the other extreme, to burning the candle at both ends; or to a variety of central factors in the nervous system; and so on.

II. BODY SATISFACTIONS

From what we have just said, it is obvious that our organic needs are states of the body that have to do with the preservation of its life and health and its ability to fit itself into its surroundings. When broken down into their elements, they appear as sensations of touch and pressure, warms, cools, aches, pains, and the like. The release of the organism from the tensions that such states arouse gives rise to a new set of experiences.

Hunger pangs, in the ordinary course of events, disappear upon the ingestion of food and are replaced by sensations of fullness. Thirst is satisfied by contact of liquids with the dry membranes of the mouth and throat, followed by sensations of coolness and wetness. The sex orgasm, considered solely as an organic sensation, is due to muscular contractions which occur in both the male and female genitalia. The experience that comes in its wake is one of repose and relief from strain.

Satisfaction of those demands of nature that arise from the need to empty the bladder or to cast out waste matter is felt chiefly as a sense of freedom from pressure, when the things that cause it are

finally got rid of. The same situation obtains when the mother's breasts are emptied of their milk. The presence of fresh air or the return of the respiratory system to its normal way of acting is usually enough to cause sensations of smother and stifle to disappear.

Finally, the actual satisfying of body wants may clear up a state of nervousness. In other cases, however, it may take more serious measures to obtain relief, such as complete rest, change of occupation or environment, release from duties, withdrawal from society, and so forth.

Before closing my remarks here, I should like to mention the needs and satisfactions that are created rather than natural. Such, for instance, is the craving for alcohol in the drunkard, and for nicotine in the habitual smoker. The want, in such cases, may become so deeply ingrained that it finally comes to act with the force of second nature; and its rise to consciousness and persistent nagging until it is satisfied, follows much the same pattern as that of hunger or sex.

III. BODY FATIGUES

We can do so much work and then we grow tired. Sensations of fatigue may be spread throughout the body; or their point of origin may be in a particular part. What we call muscular fatigue is usually confined to this or that member. When its causes are intense, it takes on a very painful quality. As a local phenomenon, it is due to a breakdown of tissue through heavy exertion; or to an accumulation of metabolic waste matter in certain areas of the body. But when it is present everywhere, it is likely accounted for by poisons in the blood stream. The action of these toxic substances on the nerve cells of the cortex has the normal effect of producing drowsiness. Under the heading of body fatigues, Luciani also groups the sensations of satiety that follow on sexual satisfaction; as well as the experience of weariness after eating a hearty meal. In this connection, it is worthy of note that mind, in its quest of knowledge, behaves in quite a different manner. Thus, the findings of the laboratory make clear that even prolonged use of mental energies not only leaves the intellect unfatigued, but also has little or no influence on the metabolic changes of the body.

IV. BODY ILLNESSES

Most of the sensations that keep company with the diseases of our human frame can be classed as pains and aches. These are situations where tissues and organs are attacked, injured, and sometimes destroyed. There are other cases where the body or one of its members is merely thrown out of gear in its normal healthy functioning. Here, again, pain appears to be the main ingredient of the sensation. All our internal organs seem able to undergo experiences of this kind when the right stimulus (if I may use the word for something that makes us feel so bad) is present. The problem of right stimulus is really a curious one. Thus, the intestine may be cut or burned in a surgical operation without pain. But "an undigested bit of beef, a blot of mustard, a crumb of cheese, a fragment of an underdone potato," to borrow some of Scrooge's small excuses, may cause a most acute sensation of colic.

Other examples will help to give us a better notion of the qualities of the pain that comes from organs. For instance, muscular pain may grow so strong that it amounts to an illness. Its cause may be found in excessive twisting or bending of the tissues, concentration of poisonous substances, damage to cells through overwork, and so on. Toothache is due to decay, or to some kind of chemical or thermal anomaly in the dental substance. But it may be brought on by extremes of heat or cold, or by unusual changes in the chemistry of the tooth. Headache may be ascribed to untoward pressures between the brain and cranium. The sensation varies with the pressure of the pulse, and can reach an agonizing pitch when we get the impression of a tight metal band encircling the head. The colic pains we mentioned above are accounted for by the pressure that the distended small intestine is exerting on the peritoneum.

Referred pain is a sensation that is localized in one part of the body, though the stimulus for it actually occurs in another. As a rule, it takes its origin in an internal organ and is felt somewhere on the surface of the body. An example is the pain that arises from a condition of the heart but is experienced in the shoulder. There are other kinds of organic illness that can hardly be described as painful, yet are accompanied by sensations of extreme unpleasantness. Thus, nausea can be traced either to the presence of mate-

rials in the stomach that are unfit for digestion, or to the reflex movements that tend to expel such materials. Sometimes the mere picturing of foods that have made one sick, or of events with which a nausea has been associated, is enough to induce a vomiting reaction. As to the amount of imagination that enters into seasickness, it is difficult to say, since there is usually some pitch and roll to a ship even on calm days.

V. BODY WELL-BEING

In its root meaning, the word "coenesthesis" means a general awareness of our sensations, whether these be pleasant or unpleasant. But it is used most often in modern psychology to stand for the mass of organic experiences that tell us our bodies are in a healthy condition. Now, since health is only a means to an end, and since most of us do not think about it as long as we are blest with it, sensations of well-being normally lie along the margins of consciousness and are not brought to the fore unless something focuses our attention on them. Their ordinary function is to provide us with a background against which we can project other sensations. Under certain conditions of marked strenuousness, however—for example, a game of tennis followed by a shower—the consciousness of our physical well-being may take on a high degree of intensity. A marked sense of body fitness and buoyancy, when one feels bubbling over with energy, is often referred to as *euphoria;* but the word is also used to describe the abnormal experience of well-being when there is no physiological basis for it—when, in fact, by all the laws of nature, one ought to be feeling ill.

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Chapter 11
THE CHEMICAL SENSES

Part I: THE SENSE OF SMELL

1. Sense Organs

Our sensations of smell are aroused by means of *olfactory cells* that lie in the uppermost reaches of the nostrils. The area they occupy is clearly marked off, by its brownish-yellow color, from the rest of the mucous lining of the nose. Each cell has a short many-branched nerve process that ends in six or eight hairlets; and a long axone that forms one of the fibers of the olfactory track. The free ends of the cells face towards the source of stimulation, and are so placed that their hairlets are always floating in the thin watery medium which is found inside the nose. The basal ends send their fibers, first to the *olfactory bulb,* where they are all gathered together; then on to the center for smell in the cortex of the brain. From this brief description, we notice that the sensitive hairlets of the cells are in immediate contact with the air in the nasal chambers, or with the odorous particles that are lodged there. It is the only case, among all our sense organs, where an unbroken nerve pathway leads directly from a stimulus outside the body to a center in the cortex.

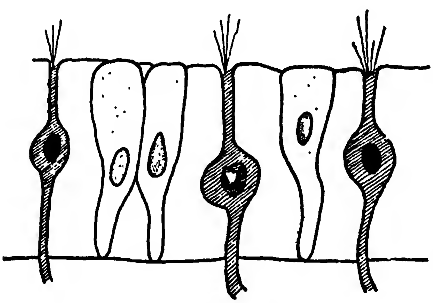

FIG. 6 Olfactory cells.

his olfactory prism we have a simpler way, seemingly, for grouping odors. It suggests the idea that there is a qualitative continuum in our sensations of smell. The six corners of the prism are marked *flowery, fruity, spicy, resinous, putrid,* and *burned.* Thus to some people's noses, the odor of a cedar tree combines the odors of flowers, fruits, spices, and resin. Again, the smell of onions is broken down into something putrid and burned, with flowery and spicy qualities thrown in.

It is plain that an objective standard for odors, such as we have for colors and sounds, will never be realized. The ancients used to say that in matters of taste, there can be no sure argument. Now, since the flavors of things are due to smell as well as taste, no final word can be expected on the problem of odors either. The manifold relations of smell are further complicated by the presence of tactual sensations in some of our odors. Menthol, for instance, smells cool, ammonia smells pungent, and pepper smells hot, because these substances are capable of arousing the cutaneous senses that are lodged at the base of the interior of the nose. According to one estimate, out of a possible 60,000 objects that have odors, only 50 or thereabouts produce sensations of smell alone.

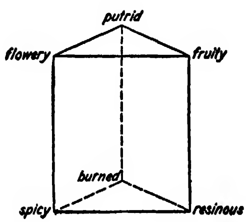

FIG. 7 Henning's olfactory prism.

4. *Threshold*

Sharpness of smell is not the same for all odors. Measurements of thresholds have been made in terms of the amounts of the odorous substances in the air that we inhale. One of the favorite items used in experiments of this kind is mercaptan, since it has a particularly vile smell and the nose is very sensitive about it. Thus, it has been found that one part of mercaptan can be detected in fifty billion parts of air. This startling figure takes on more meaning when we consider the reaction of the spectroscope—the most delicate tool of analysis in the laboratory—to the element sodium, on which it does its best discriminatory work. By comparison, the nose is three hundred times more sensitive than the tool! The fact that an odor-bearing substance has a low threshold value might lead us to think that it can produce strong sensations when used in large quantities. This

is not always the case. Tea, violets, and vanilla, for example, can be smelled in very small amounts. Yet, the quantum of our experience of them does not increase appreciably when they are present in large amounts.

5. *Adaptation*

After our organs of smell have been stimulated for a certain length of time, they become more or less insensitive to the thing that is arousing them. For example: if the opening of a bottle of eau de Cologne is held close to the nostrils, the odor gradually weakens and disappears. Complete adaptation varies with different odorous bodies. To give some figures from the laboratory: for eau de Cologne, it takes between seven and twelve minutes; for camphor, between five and seven minutes; for tincture of iodine, about four minutes; for balsam, between three and four minutes. Fatigue in the sense organ is overcome when the odor changes in strength or is taken away for a short period of time.

The ability to adapt, in matters of smell, has an important bearing on our everyday lives. Some people, for example, have to do their work in an atmosphere displeasing to the nose. But they manage to get along, once the first trying moments of unpleasantness are past. To be sure, the ugly nature of certain odors is sometimes a biological signal, meant to warn us against things that might harm us. On the other hand, agreeable odors are usually associated with objects that are beneficial to us in some way. Thus, the most widespread and enjoyable use to which we put our sense of smell, undoubtedly, is at the table where zest is added to hunger by the delicious aromas of food. Not only are odors of this sort easily recognized; they are also assets to health by favoring the flow of digestive juices.

Part II: THE SENSE OF TASTE

1. *Sense Organs*

When the tongue is exposed in front of a mirror, we notice that its upper surface is studded with a large number of small protuberances that look like pimples. For this reason they are called *papillae*. They are of interest to us because they contain the sense organs of taste. They are not confined to the tongue, however, but are found

also in the mucous linings of the epiglottis, larynx, and parts of the throat. Chloroform would not have a sweetish odor if some of the particles we inhale did not fall on the back of the soft palate and evoke sensations of taste.

The end organs that bring about our gustatory experiences are the *taste cells*. In the papillae, they are usually arranged in groups to form a bud. At their free ends they have a cluster of tiny hair bristles that stick out through the pore of the bud towards the surface of the tongue, where they come in contact with the saliva. At their deep ends, each cell is enveloped in terminal branches of the glossopharyngeal nerve that carries their impulses to the brain. The tongue is also supplied with fibers from the lingual nerve, which is linked up with the cortex and makes us aware of the warm, cool, pressury, and painful qualities of things in the mouth.

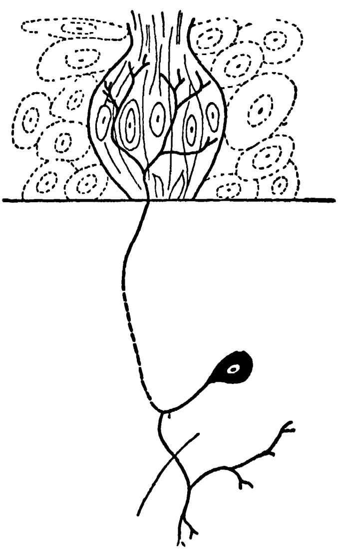

FIG. 8 A taste bud.

2. *Stimulation*

Before our food can make an impression on the brushlike ends of the taste cells, it must first be changed into soluble form. This is done by chewing it thoroughly and mixing it with saliva. As with smell, so here we are not able to say how stimulation comes about; but it is surmised that some kind of chemical reaction is set up in the hairlets of the sense cells, as a result of their being bathed in the salivary contents. Thus, if a bit of blotting paper is used to dry the front of the tongue and then a grain or two of sugar dropped on it, we do not taste anything until the pores have become moist again. The molecular dispersion which follows on the blending of food with saliva perhaps creates a new pattern in the chemical make-up of the hairlets; and this may be enough to arouse nerve currents which, on their arrival at the proper center in the cortex, give rise to sensations of taste.

3. *Quality*

It is usual to distinguish four primary qualities of taste: *sour, salty, bitter,* and *sweet.* The relation between our experience of these qualities and the chemical nature of the stimuli that arouse them has not yet been worked out in any thorough-going manner. As samples of substances that can provoke sensations of this sort we may mention, for sour: hydrochloric acid; for salty: ordinary table salt; for bitter: quinine; for sweet: cane sugar. Although there are exceptions to the rule, we can say in a broad way that sour reactions come from acids;· salty, from inorganic salts, especially those of chlorine, bromine, and iodine; bitter, from alkaloids; and sweet, from carbohydrates. Henning used a pyramid to illustrate the four primaries of taste, with sweet, sour, and bitter at its base, and salty at the peak. As in his odor prism, it suggests the idea that there are blends of some of these primaries.

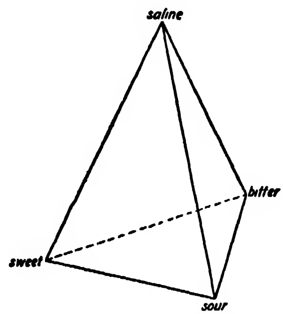

FIG. 9 Henning's gustatory pyramid.

But the various ways of combining our fundamental tastes do not furnish us with nearly so wide a range of experiences as the gourmands would have us think. What we eat owes its attractiveness not only to the keenness of the tongue, but to its appetizing odor, its visual appeal, and its touch and temperature qualities as well. When the nostrils are closed, even the best claret wine tastes like vinegar; and beef tea is no better than a weak solution of salt. An iced glass of lemonade on a hot summer's day is delightful for several reasons: it mixes bitter, sweet, and sour in a most inviting manner; it has a pleasant fruity odor; and it is smooth and cooling to the tongue and throat.

There is some evidence that we have four different kinds of sense organs to match the four primary qualities of taste. Whether all the cells that make up a single bud are the same or not, it is impossible to say. But very probably they are. In fact, it is also likely that all the buds entering into the structure of any single papilla are the same. The fact that tastes are fairly well localized would point to this conclusion. Thus, we experience sweetness most easily

on the front of the tongue; so that it must be heavily impregnated with taste buds for just this sort of sensation. In the same way, the sides of the tongue are most sensitive to salty and sour substances; while the back seems specially reserved for sensations of bitter.

4. Threshold

The threshold values for taste are not nearly as low as those for smell. There is a meaning in this fact, since it is easier for nature to warn us against harmful things by sensations of smell that require only sniffing, than by sensations of taste that usually entail the chewing and swallowing of food. So the nose is more delicate in its responses than the tongue.

In studying the threshold values of our four basic tastes, we can use the same substances we mentioned above. The figures that follow are in terms of grams per 100 cubic centimeters of water. Tested in this way, the smallest amounts needed to arouse clear sensations are: for cane sugar, 0.5 of a gram; for table salt, 0.25 of a gram; for hydrochloric acid, 0.007 of a gram; and for quinine, 0.00005 of a gram. Here again we notice the wise provision that nature has made against our biological needs. Bitter things, most of which are alkaloids, are not so necessary for the body. In fact, they may be a positive threat to our health. Sweet things, on the other hand, are needed to refuel our muscles and other organs with energy, so that we can do the work that is expected of us. Now, it takes just a short glance at our figures to see that the tongue is actually ten thousand times more sensitive to quinine, which is bitter, than to sugar, which is sweet.

5. Adaptation

Adaptation of the tongue to a particular quality of taste seems to be quite rapid. It can take place in anywhere from one to three minutes. But we recover our ability to respond very quickly, too. Moreover, adaptation of one area of the tongue to a given quality, for example, salty, does not make it lose its sensitiveness to other qualities. We do not notice these matters very much, because the flavors of our food change from one item to another in the course of a meal; and also because, apart from hurried meals, we usually allow a certain length of time between mouthfuls. One of the interesting

things that all of us have experienced is the contrast of flavors. Thus, with the same amount of sugar, a cup of coffee before dessert tastes sweeter than after the whole meal is over. Again, a plum which seems sour if eaten before a piece of candy, may taste sweet when taken after a grapefruit.

6. A Comparison of Taste and Smell

We have spoken here and there, and more or less casually, of the relative values of taste and smell. Now let us compare them in orderly fashion.

First, from the point of view of *stimulus*, most substances that yield pure sensations of taste have no odors. Good examples are sugar, salt, and quinine. Some things produce the same quality of taste and are distinguished only on a basis of other properties, such as odor, smooth or rough texture of surface, warmth or coolness, and so forth. The apple and onion are favorite materials for a laboratory test. Thus, when the onion is left to soak until its sting is removed; and when minced morsels of both apple and onion are placed on the tongue of a person whose nostrils are blocked up, it is impossible to tell one from the other since each tastes sweet. Again, things that appeal to taste are readily soluble in water; those that we smell can be easily dissolved in oil. In fact, the essences of peppermint, rose, turpentine, and other typically odorous substances, are all oils.

Secondly, from the standpoint of *thresholds*, we taste only strong solutions of a substance, but can smell dilute ones. But here, again, it is a matter of relativity. To make a true comparison, we must use some sort of chemical that can be both tasted and smelled. Ordinary alcohol, such as the kind called spirit of wine, satisfies these conditions. Now, the astonishing fact is that we need about 24,000 times more alcohol in solution to just taste it than to just smell it. Without doubt, then, the nose is the superior of the two senses. Yet, in man it is a fairly crude organ when compared with the same organ in animals. Human beings, however, have intelligence to safeguard their interests; so they do not need to worry about their lack of development in this respect.

Thirdly, when viewed from the angle of *conscious reaction*, odors are more closely tied up with memories and emotions than are flavors. This is true whether the things out of our past were pleasant

or unpleasant to experience. Moreover, we always associate the stimuli of taste with the mouth, since food is meant to be eaten. But in the case of smell, although the stimulus is in the nostrils, we do not usually think of it as being there. Rather, the tendency is to place it in the object from which the odor-bearing particles arise. Thus, it would make most people shudder to picture the evil things that they smell, as coming in direct contact with their olfactory organs; but such is the case.

Finally, from the standpoint of *survival,* smell appears to be dulled by age sooner than taste. At first blush, this runs counter to what old people themselves have to say about the matter; because their common complaint is that food now lacks the flavors it had when they were younger. But it only proves a point that was made before: that most of the so-called pleasures of taste are really pleasures of smell—as any one knows who is suffering from a bad head cold. Cases are not exceptional where the sense of smell decays and disappears altogether.

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Chapter 12
HEARING

1. Stimulus

Matter makes its impression on our senses in many ways; and while we do not have receptors for picking up all its messages, we still are able to gather together a fairly well-rounded mass of information. The end organs of somesthesis register its pushes and pulls, along with some of its thermal and painful properties. The nose and tongue tell us about its chemical qualities. The ear is built to record its vibratory movements. And, as we shall see in the next chapter, the eye reveals at least some of the secrets of its electromagnetic energy.

To understand how the sense of hearing is stimulated, let us turn to a simple example from physics. When a tuning fork is struck, the air around it is thrown into motion. The disturbance set up by the to-and-fro swinging of the fork is known as objective sound. Because the air is an elastic medium, any scattering action on its particles is passed along to other particles; and this goes on till the fork comes to rest. We do not hear it in its final movements, because these are outside the reaches of the ear. In dry air, sound has a speed of 1087 feet a second, which is slightly better than 12 miles a minute. A man in a jet plane can go faster than this; so that if a clap of thunder were to occur just behind the tail of his machine, he would never hear it.

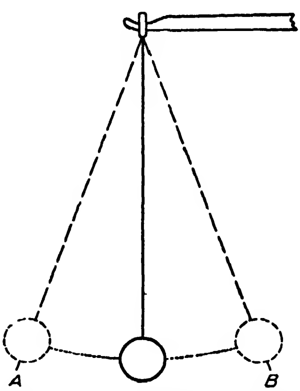

FIG. 10 The pendulum bob.

Another example from physics will clear up some of the details of sound.

When a pendulum bob is set in motion, we notice that it swings back and forth along a definite path. Suppose that it starts from a fixed point, *A* in our figure. It moves over to *B* and then back to *A*. The arc thus described makes one complete vibration. Now, by counting the number of to-and-fro movements in a second's time, we get the frequency of the vibration; and by measuring the distance from *B* (the point of greatest displacement) to *A* (the original starting point), we get the amplitude of the vibration. Of course, the pendulum is going too slowly to be heard; but all the facts that we have observed about it can be applied to the tuning fork. Thus, the frequency of the fork's vibrations accounts for the *pitch* it produces; while their amplitude is the cause of the *intensity* of the sound. The pitch, it should be noted, always remains the same; whereas the intensity gradually decreases, as the energy imparted by striking the fork is used up.

2. *The Structure of the Ear*

Taken as a whole, our hearing apparatus is made up of three parts: an *outer ear*, which is turned towards the world of sound; a *middle ear*, known also as the tympanum or drum; and an *inner ear* which, besides the rôle it plays in our sensations of sound, also has to do with balance, as we saw in a previous chapter.

I. OUTER EAR

The outer ear has two main sections: the *pinna* or *auricle;* and the *meatus*. The former is what we usually mean when we speak about a person's ears. It can be large or small; round or pointed at the top; curved outward or more or less parallel with the sides of the head. In any case, it is scarcely more than a piece of ornamentation; and we could get along without it. The meatus is the passageway that leads to the drum. It changes in width as it curves inward, and is filled with a waxy secretion that guards it against the entrance of harmful bodies. The general shape of the outer ear is suggestive of a trumpet, or perhaps better, of a funnel. Though fairly firm in structure, it can be stretched and pulled this way and that. A dog's ears are more serviceable. They can be pricked up and faced towards the thing that arouses its auditory interest. Not so man's. The best we are able to do is to turn our heads; or, if we are

opens with any swallowing movement. In this way, the air in the drum is renewed and its pressure kept in balance with that of the atmosphere outside. Should anything disturb this balance, such as travelling at high altitudes or through a deep tunnel, a sensation of pressure, along with the loss of hearing, is liable to be experienced.

III. INNER EAR

The inner ear is the most important of all, since it houses the organ of hearing. It lies in the temporal bone and comprises a system of hard osseous tubes, within which we find a corresponding system of membranes. The vestibule and semicircular canals of the inner ear have already been dealt with, when we talked about our sensations of balance. We now come to the *cochlea,* which is concerned with our sensations of sound. It is so named because, in outer appearance, it looks like the shell of a snail. Though it has a maze of parts, as we shall see in a moment, the overall size of the cochlea is not much larger than a good-sized pea. Thus from base to apex, it measures only about a quarter of an inch. But in spite of its smallness, it has a very grave task to perform, since it gives shelter to the miraculous little organ that is able to change over sound waves into sensations of tones and musical nuances of an unbelievable range and complexity.

The walls of the cochlea are twisted and coiled nearly two and a half times around a central pillar called the *modiolus.* Jutting out laterally into the cochlear tube, a minute bony plate, called the *spiral shelf,* winds its way around the modiolus towards the tip of the shell, like the threads on a screw. But the spiral shelf is not wide enough to reach to the inside wall of the cochlea; so the gap is closed by the *basilar membrane.* In this way, the whole cochlea is divided into an *upper* and *lower chamber.* When we look at the cross section in our book, we notice that another membrane, *Reissner's,* also runs off obliquely from the edge of the spiral shelf. This forms a *middle chamber.* It is filled with *endolymph*—the same watery fluid which, as we noted on a previous page, flows through the vestibule and semicircular canals. But, whereas its movements through the canals are able to arouse sensations of balance, here in the middle chamber of the cochlea, they furnish the stimulus for our sensations of sound. The upper and lower chambers are also sup-

plied with a fluid called *perilymph,* which is really the same as the endolymph except that it is confined to different membranous parts of the cochlear tube. Connection between the fluids in the upper and lower chambers is made through the *helicotrema* which is a small gap at the top of the cochlea.

We have already described how the *oval window* is closed by a membrane, attached to the footplate of the stirrup. Now, this win-

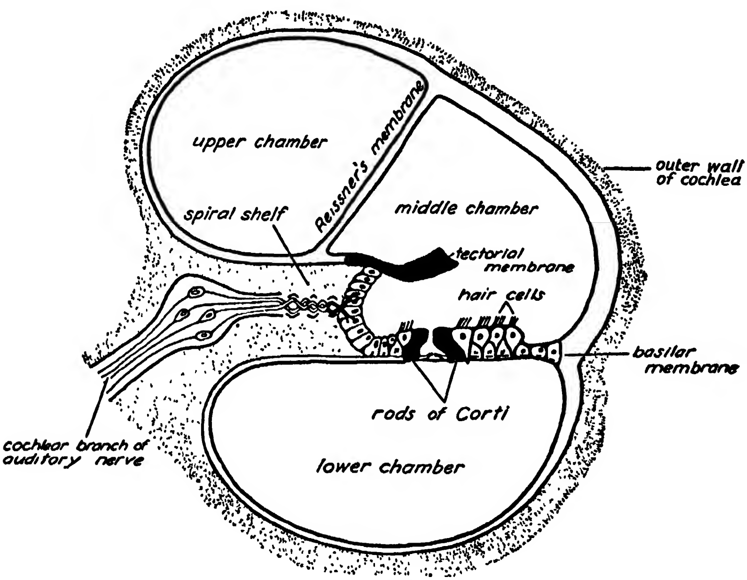

FIG. 12 A cross section of the cochlea.

dow opens into the upper chamber of the cochlea. Just below it is the *round window* which is likewise covered with a loose membrane and is the means of access to the lower chamber. Within the middle chamber, formed by the basilar membrane, Reissner's membrane, and the inside wall of the cochlea, we come at last to the *organ of Corti,* the actual organ of hearing. It rests on the basilar membrane, as we notice in our picture, and is made up of a mass of cells with hairlets. These are the true receptors for stimuli of sound. The hair cells are topped by a *tectorial membrane* and are well stocked with the dendrites of nerve fibers that run through a tunnel

in the spiral shelf, course downward through the modiolus, and finally come together to form the cochlear branch of the auditory nerve.

3. *Stimulation*

Sound waves, travelling through the meatus of the outer ear, strike on the drum membrane. Here they are passed along to the three small bones of the middle ear. Each vibration of the sounding body has the effect of driving the footplate of the stirrup inward. This starts a wave motion in the perilymph, which lies behind the membranous covering of the oval window. Once the fluid in the upper chamber has been displaced, its movements are transmitted to the fluid in the lower chamber: either through the helicotrema at the top of the cochlea; or by pressing down on the adjoining fluid in the middle chamber, since the basilar and Reissner's membranes, on two of its sides, are soft and easily reactive to pressure. As a matter of fact, communication takes place through the helicotrema only when the vibrations of the sounding body are very slow. For ordinary sounds, where frequency is fairly high, disturbances in the perilymph of the upper chamber reach the lower chamber through the fluid in the middle chamber. To complete the picture of the physical events here described: with the bulging inward of the membrane on the oval window, there is a bulging outward of the membrane on the round window. This is simply a law of pressures: if you indent a rubber balloon at one spot on its surface, you make it swell more in some other area.

The point not to be missed in all this account, is the swinging back and forth of the basilar membrane, as the ear fluid in the middle chamber is thrown into motion. For this, precisely, is the way that the organ of Corti is aroused. We have had to follow a roundabout route in getting to the area of stimulation, especially when we compare hearing with smelling where the events that lead up to stimulation are so much more direct and easy to follow. Vibrations in the basilar membrane, caused by the pressing down movements of the endolymph, throw the organ of Corti into action. The hair cells are pulled now in one direction, now in another, by the tectorial membrane that covers them. In this way, nerve currents are discharged into the fibers that connect the hair cells with the cochlear branch of the auditory nerve. Once on this track, they are

carried to their proper seat in the cortex of the brain, where they are translated into sensations of sound.

4. *Auditory Sensations*

Our sensations of hearing may be grouped together in two classes: tones, or musical sounds; and noises, or nonmusical sounds.

I. TONES

The first thing to be noted about a tone is that it has a definite *pitch*. This aspect, as we said at the beginning of the chapter, depends on the frequency with which vibrations are sent out by the sounding body. The range that can be heard by the human ear falls somewhere between 20 and 20,000 vibrations per second. Most of the music that we listen to, however, does not go beyond the compass of tones represented by the strings of a piano: 32 vibrations per second for the lowest key; and 4096 for the highest. Even within these rather narrow limits, some people do not appreciate the values of sounds at the ends of the keyboard.

The second thing that we notice about the tone is its *intensity*, which depends on the amplitude of the wave set up by the sounding body. Changes in strength are not hard to discern. When the *G* string on a violin is given a vigorous blow, we can see that the line of deflection it takes is much greater than when we pluck it gently. The effect on our ears is a more forcible impinging of sound waves and an awareness of greater volume. But if the energy with which we strike different keys on the piano is kept constant, the various pitches of sound do not seem equally loud.

The third thing we become aware of is that each musical tone has a *timbre* all its own. This makes it possible to tell it apart from other tones that have the same pitch. For instance, the piano, violin, flute, trumpet, and human voice may be sounding the same note; yet each is heard with its own distinctive quality. To account for the phenomenon, let us turn to the figure in our text. Low *C* on the piano vibrates 32 times per second. Now, by using a device of the laboratory, we can change the movements of the string so that it vibrates by halves—in which case each half will sound at the rate of 64 frequencies per second, or double the number of the original note. The same thing can be done with thirds, fourths, fifths of the string, or as far as we want to go; but it is enough to say that every vibrat-

ing body makes these divisions itself, by a law of natural harmonics. Coming back to our example of low *C:* when it is struck, it produces, not one note, but several, made up of (a) the *fundamental tone* of 32 frequencies per second, corresponding to the vibration of the string as a whole; and (b) certain *overtones,* that answer to the vibration of the string by parts. Now, it is mainly to these latter that timbre is due. All sorts of variations in overtones can result from differences in materials, the age and structure of the sounding body, the way it is used, and so on. Another item of interest that may be gathered from our figure is the explanation of *octaves.* Why do they create the same tonal impression on our consciousness? Simply because their overtones are identical!

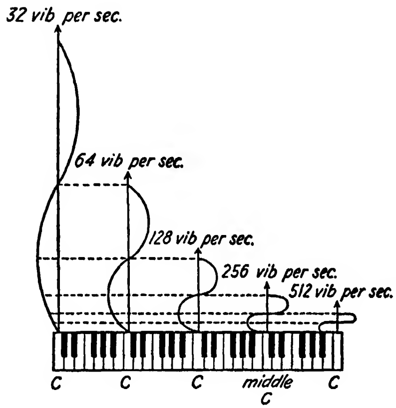

FIG. 13 The production of partial tones and their correspondence with upper octaves.

When two or more musical tones are heard together, they may impress us as a single smooth experience; or as a rough, edgy, and even warring mixture of sensations. The first kind of conscious reaction is one of *consonance;* the second, of *dissonance.* The greatest authority in modern times on all these matters of hearing was Hermann Ludwig von Helmholtz. To him we owe most of what is now known about overtones. As in the case of octaves, so here in the problem of harmonies and discords, the secret of their peculiar qualities lies in overtones, or, as Helmholtz more properly calls them, upper partial tones. Thus, when there is identification of these partials, we get a sensation of consonance; when, on the other hand, they refuse to blend, we are aware of a dissonance. This latter phenomenon also suggested to Helmholtz the basic reason of our experience of *beating.* This is the sensation of a throbbing or pulsating effect in the sounds to which we are listening. It is easily noticed when an organist happens to be playing two notes together that have only a slight difference in their rates of vibration. Thus, as their overtones fuse with one another, there is a natural swelling

of the volume of sound; but as they run counter to one another, the overall strength of the stimulus dies down. When beats occur too often, they have the same unpleasant reaction on consciousness that any broken or irregular set of stimuli produces.

Our sensations of discord, however, are not entirely a matter of warring overtones. The fact is that we can change our minds about whether a piece of music is consonant or dissonant. Thus, from the psychological point of view, learning has a great deal to do with our appreciation of tones and their combinations. What at first hearing may have struck us as distasteful may come, in time, to be enjoyed. Indeed, if we are to judge by what has already been done in the field of our musical education, it is likely that many of the things we now regard as dissonances will be esteemed, some day, as full of beauty; so the problem, in part at least, is one of personal equation.

5. *Theories of Hearing*

Although science has been working for nearly a century on the mysteries of hearing, it has not yet succeeded in giving a complete account of the way that we analyze sounds. The astonishing thing, of course, is the number and variety of pitches we can hear when, for example, we are listening to a symphony. Here the ear not only tells one tone from another, and hundreds of them at the same time; but it is also able to distinguish among overtones, and lay its delicate finger, so to say, on the very instrument that is creating this or that particular kind of tone. How does it accomplish such a feat? The answer has always been a puzzle—even to so great a genius as Helmholtz. Yet, what he has said is perhaps the best explanation ever made of the matter.

I. THE RESONANCE THEORY

According to Helmholtz, the analytic power of the ear is based on the principle of sympathetic vibration. Thus, if middle *C* is sung into an open piano, the string which has the same frequency will be set in motion. Moreover, the strings corresponding to the more prominent overtones will also vibrate. Helmholtz proposed the idea that the inner ear acts in the same way when sound waves pass through the cochlea. Searching for a resonator that could produce these effects, he naturally fixed on the basilar membrane, since this is the

soft mat on which the organ of Corti is laid. It is made up of about 24,000 fibers, and in its general structure is like the strings on a piano. To make the resemblance even more striking, we also find differences in the length, tension, and mass of the fibers, as is the case with the strings on a piano. Thus, careful research shows that some fibers are three times as long as others; that changes in tension are supplied by the spiral ligament which attaches the basilar membrane to the inner wall of the cochlea; that increase in mass is furnished by the increased fluid load which the fibers must carry as the level of vibration gets farther away from the oval window—their point of entry into the cochlea.

Objections are raised to the theory on the ground that no fibers are more than one-fiftieth of an inch in length, and that their closeness to one another militates against their acting as single resonators. The difficulties here are more imaginal than real. It is hard for us to picture a piano of thumb nail size or even smaller, as the basilar membrane must be. But why not? It is not a matter of dimensions but of proper proportions; and other things being equal, a small resonator can be just as perfect as a large one. Further, such facts as tone fatigue and tone deafness are best explained by the place features of the Helmholtz theory. Thus, depletion of the power of responding to a given tone would be accounted for by fatigue or loss of energy in the fibers that are sympathetically moved by that tone. Inability to hear certain tones would be explained by the absence of their corresponding fibers, or by the presence of what are called tonal gaps or tonal islands in the basilar membrane. In fine: the reason we can separate one tone from another is because we have a special receptor for recording each tone that we hear. This receptor, in its simplest form, is a fiber of the basilar membrane with the set of hair cells out of the organ of Corti that are attached to it. It is sympathetically aroused by a wave movement in the endolymph which corresponds to its own natural rate of vibration. There is a graduated arrangement of these receptors, as the basilar membrane and organ of Corti wind around the inside of the cochlea from bottom to top.

II. THE TELEPHONE THEORY

Another explanation of our power of tonal discrimination is the telephone theory of William Rutherford. It suggests the idea that

the basilar membrane vibrates as a whole rather than by parts. In this case, the cochlea is looked at simply as an instrument for transmitting messages to the brain. It does not break down the complicated pattern of sounds, such as we hear in an orchestra, into the several tones that make it up. Rather, it passes along the whole pattern to a higher court of appeal when it hands over to the cerebral cortex the task of resolving this pattern into its elements. In such a case, the nerve currents set up in the organ of Corti are faithfully reproduced at the level of consciousness, where the work of analysis follows. For the frequency of sound waves and their strength, therefore, we have an exact counterpart in the frequency and strength of nerve currents at the centers of hearing in the brain. The theory has its interesting points; but it went out of favor when it became known that the rate of nerve currents is not fast enough to account for the higher frequencies of sound that we hear.

III. THE VOLLEY THEORY

A way around the last-named difficulty has been offered in the volley theory of Ernest Wever and Charles Bray. Thus, some very ingenious experiments were devised to show that the nerve fibers of the organ of Corti may be excited in staggered sequence. By the concerted action of several fibers, a volley of currents could be aroused and sent on to the brain; just as a drummer who uses two sticks, is able to beat a tattoo which is twice the rate of one stick. But the theory also accepts the general idea of a placement of frequencies along the basilar membrane; and so it tries to keep what it considers the best features of the explanations of both Helmholtz and Rutherford.

IV. THE SOUND PATTERN THEORY

Other theories have been advanced to account for the phenomena of hearing; but there is little or no evidence to back up their claims. Before bringing our chapter to a close, however, a word may be said about the findings of Julius Ewald, who worked on a rubber model of the basilar membrane. From his experiments, the conclusion was reached that sound stimuli cause evenly spaced stationary waves on the basilar membrane and that the number of such waves varies with different sounds. Pictures taken of the model in motion showed up the waves as dark transverse streaks of

microscopic size, with fixed intervals for each separate tone. This led Ewald to believe that the basilar membrane vibrates as a whole to any sound, but with a different configuration for each note or series of notes. The main trouble with his theory was the presumption that the model and the basilar membrane had fibers of *proportionately* the same length, tension, and mass, and that they actually worked in the same way. Even Ewald himself was not sure that such was the case. Of course, the sound pattern theory is at direct loggerheads with the Helmholtzian idea that hearing is basically a matter of resonating elements in the inner ear.

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2. *The Structure of the Eye*

The human eye is a globe about an inch in width, with a small projection in front which looks like the segment of another smaller globe within the larger one. From the illustration in the text, we see that the eye has three tunics or coats. The first or outside coat is the *sclera.* It is modified in front to form the exquisitely clear *cornea.* The second or middle coat is the *choroid* which is marked by the richness of its blood vessels. Its main concern is to look after

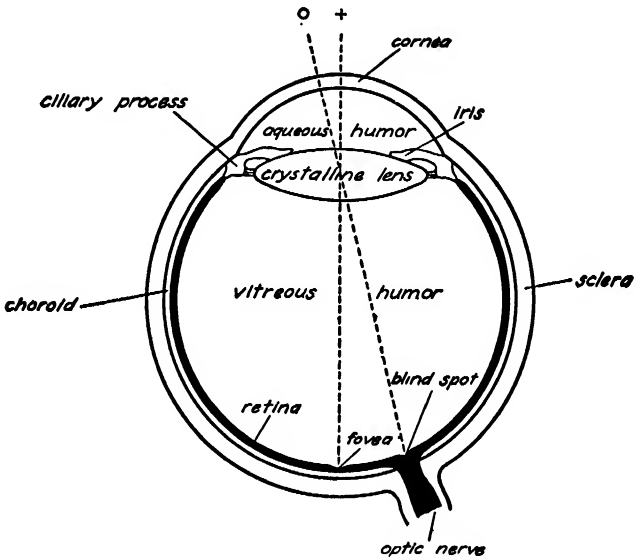

FIG. 14 The eye.

the metabolic needs of the eye. It clings to the outer tunic everywhere except in front. Here it falls back to form the *iris* which is pierced by the round opening known as the *pupil.* Iris, we remember, was the goddess of the rainbow; and her name is now used to designate that part of the eye which gives it its distinctive color. It is supplied with tiny muscle fibers that help to regulate the size of the pupil. The third or innermost coat is the *retina.* It has ten layers of tissue, all told; and the second of these, counting from the direction in which light enters the eye, is provided with a mass of

organs called *rods* and *cones*. These latter are the true receptors of light stimuli.

At the central portion of the retina part of the tissue is somewhat thinned down so that there is more direct exposure of the visual organs to the action of light. This area is known as the *yellow spot*. Its counterpart is the *blind spot*, where the fibers of the optic nerve are bundled together and leave the retina. The rods and cones make a delicate mosaic in which the individual receptors are arranged with striking order and regularity. The cones, however, are better developed and more robust looking than the rods; and there is no doubt about their superior properties. At the yellow spot we find no rods at all; farther out in the retinal zone, they begin to outnumber the cones; still farther away, only rods are found.

Behind the pupil of the eye is a dense and elastic body called the *crystalline lens*. But it is not the only lens in our optical system. As a matter of fact, it has less to do with the refraction of light than the cornea. But it is more adjustible than the latter. It is convex on both surfaces, and separates the interior of the eye into two chambers: one reaching to the cornea in front and filled with *aqueous humor;* the other extending to the retina in back and filled with *vitreous humor*. Like the water and glass after which they are named, both humors are refracting media. The effect of light passing through the cornea, lens, and humors is to cast the image of an object on the retinal screen. The picture is upside down, of course; but since we are accustomed to this from the beginning, the proper allowances are made at the cortical levels of interpretation.

3. *Stimulation*

The work of the eye as a whole may be regarded as a series of adaptive movements, made in reply to the impinging of light waves.

First, the entire eyeball is lodged in its socket in such a way that it can be turned in several directions, even without any movement of the part of the head. This is done by means of six strong muscles that are attached to its top, bottom, and sides.

Secondly, the iris is able to contract its colored curtain and so diminish the size of the pupil. This has the effect of reducing the

amount of light that enters the eye; and nature arranges it this way, either because the stimulus is too strong for comfort, or because we are looking at a close-up object and do not need a great deal of light. Should one or the other of these conditions be reversed, then the pupil opens up again.

Thirdly, the crystalline lens has an inherent power of fitting itself to the distance of objects. We call it accommodation. Thus, if we are looking at something fairly close, say within a range of twenty feet, the lens bulges out in front; and the closer the object to the eye, the more pronounced is the bulge. When, however, our vision is shifted to something at a distance, the movement of the lens is rather in the nature of a relaxing of what was tensed; and so we do not call it accommodation.

Fourthly, and most important of all, the retina can adapt itself to the various kinds and amounts of light that fall on it. Moreover, what it gains by such movements it does not readily lose. Here, again, nature is acting as a wise mother, since the objective fluctuations of light might harm the eye, did it not have enough time to prepare itself properly for the reception of stimuli. The action of light on the retina, of course, is the thing that incites it to see. The cones and rods are nerve cells; so that when the various lengths of luminous waves affect them, they generate currents that are sent over a series of intermediate cells to the neurones of the optic nerve. The fibers that come from these last-named bodies are collected together at the blind spot, where they form the beginning of the optic tract. Once an impulse is established on this highway, there is nothing to impede its movement until it reaches the center of vision in the brain.

4. The Wonders of Vision

When we run through the gamut of our sensations with a view to fixing their order of importance, those of vision must surely occupy first place. This is true, not only because of their large number, but also because they have a most singular meaning for the higher life of mind. So we say, very rightly, that blindness is a greater loss and a harder burden to bear than deafness. There is some peculiarly psychological element about our sensations of light and color. It is almost as though they were able to share in the nature of our thoughts. When we understand something, we say: "I

see"; and "the mind's eye" is a common way of describing our faculty of insight. But the matter does not stop there. We have a habit of transferring the qualities of vision to our feelings when they are "blue"; to our tastes when they seem "dark brown"; to our pains, when they are "light or dark"; to our appreciation of sounds when they have "tone color." Visual power, then, is surely unique; and the richness of information that it lays in the lap of intellect is without compare, so far as the other outer senses are concerned.

Our awareness of light, in all its myriad forms, is what may be called, for want of a better phrase, an ultimate datum of sense knowledge. By this I mean that there is no way of describing it except in terms of itself. We can use the categories of visual experience in order to paint a picture of other sensations, as I remarked above; but what terms shall we use when we try to express our conscious reactions to color? I mention this here simply as a caution: that we must be ready to face harder problems as we mount higher on the ladder of consciousness. To come to our task, then: sensations of light are of two general classes. Some deal with colors and are therefore called *chromatic*. Others have to do with light waves that are not true colors (although people commonly refer to them as such); and these are *achromatic*.

5. *Chromatic Sensations*

Our sensations of color appear in consciousness as a qualitative series: starting with red, going through the shades of orange and yellow to green, and continuing on through blue to violet. The experience, in each case, has something distinctive about it. Just as, in the case of tones, we speak of their *pitch, volume,* and *timbre,* so we can talk about colors in terms of their *hues, saturations,* and *brightness.*

I. HUE

The hue of a color is always determined by the length of its light wave. If it is unmixed with other light waves at the moment that it strikes the eye, then we have a simple unrelated sensation of red, green, violet, and so forth. But if two or more lengths are blended, the experience that follows depends on the ratio in which the light waves are mixed. Here we are at the roots of the difference between the eye and the ear. Thus, when *C* and *E* are struck

together on the piano, the ear does not hear them as *D* which is in between; but as *C* and *E*. But when red and yellow impinge on the eye at the same time, it sees them, neither as red nor as yellow, but as orange, which is an intermediate hue. So, if we refer to the ear as an organ of analysis, we should call the eye an organ of synthesis. One keeps stimuli apart, when they are presented together; the other combines them and gets something new.

The laws of color mixtures state what happens when various kinds of light strike the eye. Thus, for every given wave length, there is another which, when mixed with it, will produce a colorless sensation. This is the first law, and its effect is known as complementation. When, on the other hand, the proportions are such that they do not neutralize each other, they produce a sensation of an intermediate hue. This is the second law. The third and final law simply states that when colors that look alike are mixed, they bring about results that look alike. For instance, if yellow and blue make white, and if red and green make white, then mixing all four colors also produces a sensation of white.

II. SATURATION

Perhaps the best way of explaining what is meant by saturation is to say that a color is more saturated to the extent that lesser amounts of white light are mixed with it. It is the native purity of the color, so to speak, or its freedom from any other kind of light that might change its aspect. Now, since we usually see colors under some sort of illumination, it is hard for us to know just how saturated they are. The only time we can be sure is when we look at them one by one in the spectroscope. Then we are seeing the color —red, green, yellow, or whatever it may be—by its own intrinsic light.

III. BRIGHTNESS

The brightness of a color is its natural approach to white. From this point of view, yellow looks brighter than blue. It is a matter of wave length, on the outside; and of the sensitivity of the retina, on the inside. Now, since some people have more delicate retinae than others, the exact shade of yellow that appears the brightest may differ. In this connection, it is worthy of note that what we call the "personal equation" in our way of behaving, took its origin from

differences of response, in the *visual* field, to the same stimulus. Another interesting thing is the shift in the focus of brightness from yellow to green, when the light in which it is seen grows weaker. Thus, if I am sitting in my library as dusk comes on, the books with yellow covers turn grey before those with green covers. This suggests the further more or less obvious fact that if brightness is measured in one direction by its approach to white, it can be reckoned the other way about by its withdrawal from grey or black. It is due, of course, to the energy of the light waves that are acting on the eye. But this is not quite the whole story, since it is possible that the same amount of energy should cause different sensations of brightness in different people. In short: the personal equation that we mentioned a moment ago has a rôle to play here.

6. *Achromatic Sensations*

When our experience of light is free of hue, we call it achromatic. Sensations of this sort, like those of color, may be ranged in a continuous series which begins with white, works its way through the various shades of grey, until it reaches black. At the two extremes, we have the absence of all color (since a ray of white light is really a combination of all colors and so can be designated by no particular one) and the absence of all light. Grey, therefore, always falls in between these extremes. It can be looked at from two points of view: either as a mixture of white and black; or, more properly, as the approach of white to black. The single feature that marks all our colorless sensations is brightness. It depends objectively on the amount of light energy that is falling on the retina. But, since it is an aspect of consciousness, it can vary on the subjective side, as we noted before. What

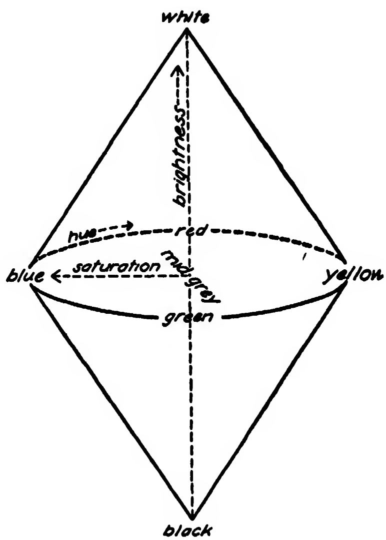

FIG. 15 The color cone. (Courtesy of the D. Van Nostrand Company, Inc.)

is known as achromatic vision is a defect in the retina which causes colors to be seen as colorless, that is, as shades of grey. It may be acquired or inherited.

The figure in our text shows the various attributes that we have given to our visual sensations. It is made up of two cones with a common base. One vertex is for white; the other, for black. The colors ranged on the perimeter are the four fundamental hues. A line running from any point on the perimeter towards the white vertex would stand for brightness in the chromatic series. The line that extends from vertex to vertex through the center of the figure represents brightness in the achromatic series. Finally, the line from the center of the base towards the perimeter indicates the amount of saturation that a color enjoys. It reaches to the perimeter only when the color is absolutely pure.

7. *Peculiarities of Visual Response*

There are several other facts of visual experience that must be looked into before we can properly discuss the various theories of vision.

I. LIGHT AND DARK ADAPTATION

When we go from bright daylight into a darkened room, we have a disconcerting sensation of blindness. After a few minutes, however, the retinae become dark-adapted, which means that they grow more sensitive to weak light stimuli. Complete adjustment takes place within a half-hour's time. Beginning, now, with the illumination of the faintest visible object, we can make a steady ascent through increasing intensities until we reach the glaring strength of the noonday sun. But suppose, instead of going through this drawn-out procedure, we step at once from darkness into daylight: the same blinding effect is experienced as when we went the other way about. In the second case, however, it does not take so long to become adapted. In fact, good vision may be established within a few moments.

Another fact with which we are all familiar is the inability of the dark-adapted retina to sense colors. In the moonlight, things appear as light or dark, but not as red, or green, or any other hue in the color series. In this connection, we may also note that the central part of the retina loses a great deal of its sensitivity at night; so that

if the object we are looking at is particularly dim, like a distant star, we see it best out of the corner of the eye.

II. THE AFTER IMAGE

What I am seeing here and now may be conditioned by what I have looked at a moment ago. This is the meaning of the after-image, which is a sensation that follows as a residual effect from a previous sensation. Should the present experience reverse the qualities of the preceding one, the after-image is negative; just as black is white and white is black on the negative of a film. On the other hand, should the qualities be more or less the same, the after-image is positive.

The length of time over which an after-image continues to affect us does not depend on the duration of the stimulus so much as on its strength. Thus, we may look long and steadily at a lighted candle without getting any noticeable after-effect. But a single glance at the sun can produce results that last for hours. In the latter case, the image not only persists, but may appear in consciousness as a most unique succession of color sensations: starting with bright greenish blue, going on to true blue, reversing its field and coming back to orange and yellowish green, and so on.

It is rather extraordinary how many things we are accustomed to may be accounted for as functions of after-images. The glowing end of a match twirled around in the dark; the sliding movement of a lighted arrow on a neon sign; the graceful course of a skyrocket; the majestic sweep of a meteor; the forked viciousness of a bolt of lightning—all these objects appear as continuous lines of light because image is laid over after-image. Perhaps the best case, however, is the moving picture, where we get a decided impression of unbroken action, not because the film is seen as moving, but because the sensation of one still picture has not yet died out before that of the next follows.

III. COLOR CONTRAST

Another common effect of retinal stimulation is color contrast, which bears out the laws of mixtures that we mentioned on a preceding page. It is noticed when two colors are viewed either together or in quick succession. In the first case, the hues to be com-

pared are placed beside each other in the same plane. The adjacent margins then take on an intermediate color; or, if opponent, they tend to complement each other. A good example is the change of hue which powder undergoes when spread on the skin. In the second case, the after-image of one color is thrust on the background of the other. Thus, if a person remains in a bright red room long enough to become completely light-adapted and then steps into a bright yellow room, he sees the walls, not as yellow but as orange-colored. In fact, the effect is the same as if the red and yellow were put on a color wheel and rotated until they merge into orange.

IV. COLOR BLINDNESS

If we assign the task of sorting together small pieces of cloth of different colors, certain individuals may be found who lay colorless greys next to the green. Obviously, they have no awareness of green, as such. If the matching test is continued, all sorts of other anomalies may be revealed. It is usual to distinguish three kinds of ocular weakness where difficulties in identifying colors are encountered. The first, which occurs in about four per cent of all males, is described as *red-green blindness.* One suffering from a defect of this kind has no actual experience of red or green, though he does know yellows and blues along with several shades of grey. The second kind of failing is very rare. It is known as *yellow-blue blindness;* and for one with this handicap, only the shades of red, green, and grey exist. Finally, in *total color blindness* there is no sensation whatever of hue, but only a series of whites, greys, and blacks, much as an ordinary photograph appears to the normal eye.

The fact that a person is color blind does not mean that he cannot give the right names to colors. Thus, he may learn to associate a particular kind of visual sensation with the hue he does not see. In other instances, he may associate the size, shape, or position of the object with its proper color. Perhaps by some device such as this, one who is red-green color blind manages to drive an automobile without his weakness being discovered. In any case, the existence of color blindness seems to have passed unnoticed in human history until fairly recent times. The English chemist John Dalton was the first to give us a scientific account of the experience; and that was at the end of the eighteenth century.

marked lessening of sensitivity in the central area of the retina at night. A bright star can be seen by looking directly at it, because it has enough light to form an image on the cone-studded fovea. But the dim star simply fails to make an impression, since its light is not strong enough to arouse the cones. So we must turn our heads and allow the image to fall on the rim of the retina where there is an abundance of rods. Thus, it seems quite certain, as von Kries said, that cones are organs for daylight vision; while rods are used for the lesser amounts of illumination. And since we perceive colors only when the stimulus has the strength of daylight, cones are rightly presumed to be the organs of chromatic sensations, and rods of achromatic experience.

9. *Theories of Color Vision*

Our next problem is concerned with the distinctions we make between one color and another. This is a much harder task and, like that of telling tones apart, is full of conflicting points of view. Here we shall describe only the major attempts that have been made to clear up the mystery.

I. THE YOUNG-HELMHOLTZ THEORY

When Helmholtz first made known his theory of color vision, in 1852, he attributed it to Thomas Young who had worked on the problem some fifty years before. I think it is quite safe to say, however, that it never would have been considered so seriously in scientific circles, were it not for the brilliant researches done by Helmholtz himself in the field of optics.

The Young-Helmholtz theory is a physiological approach to the problem of color vision. It is founded on the assumption that there are three kinds of nerve elements in the retina, the excitation of which will yield sensations of red, green, and violet. All other color sensations come from the arousal of these simple elements in combination. Thus, if those corresponding to red and green are set in motion at the same time, we are aware of orange or yellow. If green and violet should be stimulated together, the sensation is of blue or indigo. If all nerve elements are affected simultaneously, we are conscious of white.

Moreover, even if only one element is excited, there is always some response in the other two. For this reason, colors are never

completely pure, but always have a certain amount of brightness. Black is accounted for simply by the absence of organs that might be positively affected. The three nerve elements, spoken of by Helmholtz and Young, have never been discovered. Yet, the theory is equally valid on the assumption of three different kinds of photochemical substances in the retina, that bring about our sensations of color in the manner just explained.

II. THE HERING THEORY

Ewald Hering's theory is a psychological approach to the facts of color vision. Its point of departure is our conscious tendency to regard one visual experience as opposed to another. In this way, we set red against green; yellow against blue; and white against black. Now, these three sets of sensations, which are paired in our consciousness, are due to three photochemical substances in the retina that have contrasted movements when aroused by light: one catabolic; the other, anabolic. Thus red, yellow, and white waves break down the substances; while green, yellow, and black waves build them up.

For instance: a red light strikes the red-green chemical in the eye. This causes dissimilation and an awareness of red. At once, the chemical begins an assimilative movement which explains the green after-effect of red. Further, a given light wave does not act on its own retinal substance alone; it also has some influence on the white-black chemical. When all colors act equally on all the visual substances, they cancel out one another; but since they affect the white-black chemical too, the result is a sensation of grey.

The color zones of the retina are determined by the presence or absence of photochemical elements. Thus the innermost zone, which is at the center of the retina, has all three; the middle zone has yellow-blue and black-white; the outermost zone, being off the beaten track of color stimuli, has only white-black. Color blindness is explained by the lack of corresponding visual elements.

III. THE LADD-FRANKLIN THEORY

The Ladd-Franklin theory is genetic in outlook. It assumes that our present ability to sense colors had grown from a primitive state of colorless vision. When the theory was first proposed, the whole at-

mosphere of science was impregnated with Darwinian ideas. In line with such developmental teaching, Christine Ladd-Franklin suggested that man's retina has had a history which is akin to the genesis of his body as a whole. Thus, at the beginning the visual substance of the eye was the same in both rods and cones. It is still the same in the rods—the typical organs of the outermost zone of the retina—where it produces sensations of grey. But in certain of the cones, it has become differentiated into two parts, one of which is affected by the longer waves of the spectrum, yielding an experience of yellow; while the other is aroused by the shorter waves, resulting in an experience of blue. These are the types of organs now found in the intermediate zone of the retina. Finally, there are the cones of the innermost zone, where further division of the yellow-reactive part of the visual substance has taken place, giving rise to sensations of red and green.

When the visual substance is completely decomposed by the action of light, our experience is always of grey or white. This can happen to the sense organs of any zone. Thus, if blue and yellow waves strike on the cones of the intermediate zone at the same time, we get a colorless sensation, since the retinal substance is broken down as a whole. But if red and green waves impinge on the cones of the innermost zone, the effect is a sensation of yellow, presumably because the visual substance is decomposed only in that part which gave birth to red and green. Hence, to experience a sensation of white or grey at this central portion of the retina, blue waves must be added to the red and green.

10. *Summary*

A word or two on the foregoing theories will bring this chapter to a close. All of them have one feature in common: they explain our experience of color as a function of photochemical substances in the retina. The action of light of varying wave lengths has the effect of releasing energy in these substances. When movements of this kind occur in the cones, and are of such a nature as not to produce complementation, then the awareness which follows is one of color. Here we are on fairly certain ground. But when we push our investigations further, and ask how we separate one color from another, the problem becomes highly involved and the answers are more or less a matter of guesswork.

Helmholtz is perhaps the safest guide. The great merit of his theory is that it starts with physical facts—the laws of color mixtures. But its strength on the outside is somewhat weakened when brought within range of the forum of consciousness. There is always a margin of experience that is not accounted for by our knowledge of stimuli and the way they act. Hering, on the other hand, begins with the facts of consciousness and then runs into difficulties with some of the well-founded laws of physics. But his special appeal to the psychologist lies in his naïve acceptance of what we all seem to experience in the world of color. Ladd-Franklin does not add much to our actual understanding of the chromatic problem—after all that Helmholtz and Hering have said. Her theory gains nothing from its evolutionary premises, since these do not make it any easier for us to grasp how, here and now, we are able to distinguish colors. The fact is that visual substances, with their divisions and subdivisions, could have been found in the human eye from the beginning; and even if they developed, we are not beyond the primary assumptions of both Helmholtz and Hering: that there are differentiated retinal elements in the eye that account for the differences in our color sensations.

One of the most troublesome items of visual experience is a good account of our sensation of black—truly the *bête noir* of all theorists. For Helmholtz, it is correlated with the absence of any light stimulus whatsoever. Does this mean that it arises from a cortical area? For Hering, it is a form of retinal adaptation, due to some kind of process that goes on in the eye. For Ladd-Franklin, it is simply response to an object that does not reflect light. The point is that our awareness of black is a positive experience. Thus, as I look at the words which I am writing at this moment, the black type stands out in strong contrast to the white paper. In the same way, when I switch off the lamp in my room, I am very much aware of the darkness which follows. Now surely it is not true to the nature of my experience, in these two cases, to say that I am not as conscious of black as I am of white; or that my sensations of the former do not have as much "body" or positive character as my sensations of the latter. And if this be so, then I should be inclined to hold with Hering's explanation of our response to black.

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Chapter 14
COMMON SENSE AND PERCEPTION

1. The Inner Senses

One does not have to be a psychologist to recognize that our knowledge is not bounded by the limits of sensations. The fact is, what the eye sees and the ear hears is only a stepping stone, so to speak, to something more perfect in the order of conscious achievement and more meaningful for mind. Thus, a little self-analysis tells us that we have the power of sifting, sorting, and unifying our sensations, and of making them into perceptual wholes; of forming images of things that are absent and no longer affecting our sense organs; of remembering past events; of knowing, at a moment's notice and without previous experience, what is good and bad for the organism.

To explain these new factors of consciousness, St. Thomas holds for the existence of four inner senses: *common sense; imagination; memory;* and *estimative power.* Here he is merely continuing the traditional teaching of Aristotle—but with certain clarifications not to be found in the Stagirite. That he could give a more balanced and systematic account of these higher levels of sense experience was due, in no small measure, to the work of the Jewish and Arabian commentators on Aristotle. This is particularly the case with the estimative faculty which, in man, is called cogitative power. Just what it does with the data of sense will be told in a later chapter.

But one may ask why we fix on four inner senses. The answer comes partly from experience and partly from a consideration of the various aspects of objects that fall on the senses. Thus, when we have a distinctive conscious attitude towards something, that is, when we approach it in a way that is different from the way we look at other things; when, moreover, this consciousness is correlated with some particular feature or "formality" of the object (as

Aquinas puts it); then we are dealing with a special power. To return to the findings of self-analysis: we have one impression of things when they are *present;* another, when they are *absent;* still another, when they are *past;* and yet another, when they are *useful or harmful.* No single one of these aspects is the same as the others; and since we can be aware of all of them, we must be in possession of four inner senses. Such is the conclusion of St. Thomas; and in our text we shall follow the main lines of his thought.

2. *The Notion of Common Sense*

At the outset, it must be pointed out that the sense we are dealing with here has nothing to do with reasoning or the forming of practical judgments, such as is implied in the expression: "He is a man of good common sense." On the contrary, common sense is exactly what its name connotes: a sense power that has something in common with other senses. More concretely, it receives the impressions of all the outer senses, and is the life-giving root from which their conscious energy is derived. We may think of it, then, as a sort of receptacle into which the fruits of sensation are poured, so that they can be worked over, refined, and given that higher unity and meaning that perception demands.

To see how it works, let us suppose that there is an object in front of us. Its color makes an appeal to the eye; its odor has a pleasant effect on the nostrils. We reach out our hand to touch it and find that some parts of it are delicate and smooth, others rough and raspy, still others pointed and prickly. Perhaps we break off a bit of it and put it in the mouth. The taste is bitter and unsavory. And so our examination goes, as one outer sense after another is aroused and relays on to consciousness some particular quality of the object in question. In the end, of course, we put all this information together and simply say that the thing is a rose. A mass of sense data has somehow become unified or knit into a pattern; so that it is possible to ascribe the separate items of experience, recorded by the outer senses, to one and the same object. Now, the psychological tool by which we do this is common sense; and we may define it as *the power of perceiving, in a sensible way, things that are here and now making an impression on the organism.*

3. *The Objects of Common Sense*

In the example of the rose which we have just given, only those qualities were mentioned that appeal to the outer senses. But it has other attributes too, such as extension, shape, solidity, distance away from the eye, size, local motion, and so forth; and these additional aspects are objects of common sense. Colors, sounds, odors, flavors, and pressury qualities are called *proper sensibles.* They are so divided between the external senses that one series—for example, color—does not appeal to any of the other end organs, but only to the eye. For this reason, they are always referred to by Aristotle and St. Thomas as proper sensibles, since each has an outer sense whose sole task is to register that particular object and no other. Common sense, by contrast, is not thus confined. It can reach out and embrace all the information of the outer senses, adding besides its own proper knowledge of those spatial and temporal features of a thing that cannot be grasped by any external sense. Because these latter attributes are common to all objects that exist in space and time, they are described in the traditional psychology as *common sensibles.*

4. *The Psychosomatic Nature of Common Sense*

We are using the word "psychosomatic" here in its literal meaning of something that has elements of both soul and body in it. From this point of view, every sense is a mixed or psychosomatic power; or, as St. Thomas prefers to say, every sense is a property of the body-soul composite. Let us see how this is verified in the case of common sense.

I. THE PSYCHIC ELEMENT

First of all, the act of perception implies a knowledge of sensations. We can express this in another way by saying that, by means of common sense, we are aware of everything that is transpiring in our outer senses, as, for example, when we see that we see. Such an act, as St. Thomas points out, could not be accomplished by an outer sense "whose range of knowledge does not extend beyond the apprehension of the sensible form by which it is changed." As a matter of fact, without common sense the outer senses would really have no value for the life of mind. From it

they receive the supreme gift of consciousness and the power of sensing their own proper objects. Moreover, if the eye *perceives* color, or the ear *perceives* sound, it is due solely to the fact that these external senses are connected with a central sense which enables them to perceive—since the act of perception belongs properly to an interior sense.

In the second place, common sense enables us to tell our sensations apart. It would be most unfortunate for the higher functions of consciousness were we to get them confused. That is why common sense is placed above the outer senses—so that, from its coign of vantage, it can be aware at once of all that is going on in each of the end organs; how, for example, the experience that arises from vision is not the same as that coming from hearing or any other sense; how whiteness differs from sweetness, fragrance from pressury quality, and so on. For, it is plain that only a power which knows all these aspects of bodies is able to say in what way the separate experience of each aspect is distinguished.

In the third place, common sense can select and combine the data it receives from the outer senses into units of experience that outrun all the knowledge of these latter powers. Here we are conscious of a whole-making achievement that immediately marks it off from mere sensation, and makes it a new and special kind of experience. When light strikes the eye, we see; when sound impinges on the ear, we hear. But the separate arousal of these and all our other end organs does not explain how and why different sensations are ascribed to one and the same object. It is especially in this power of putting things together that St. Thomas finds the superiority of common sense over the outer senses. At the same time that it is aware of differences between colors, sounds, odors, tastes, and tangible qualities, it is able to make a pattern or configuration of all that it knows.

Finally, it should be noted that once perception has become an accomplished fact, there is no need of going through each sensation again in order to have a full and well-rounded consciousness of the object. Thus, as I look out from my study, I see the first daffodils of the season, gracing the lawn here and there with splashes of yellow. My perception of them, strictly speaking, is only visual. But since I have already sensed the other qualities of the daffodil besides its color, I can fill out my knowledge by images.

of a circle, no matter what the original shape of the loop. One does not have to go to such lengths to find patterns in nature. A snowflake, or the spherical outline of a drop of water, would do just as well as samples of natural configurations. In all these cases an organized material unit has been brought into being by physical forces. According to the gestaltists, nerve currents likely follow some such patterning of the energies of nature; and from this kind of stimulation, we get configurations in consciousness. Now, there are the best of reasons for rejecting such a purely mechanical explanation; but all of them may be boiled down to the simple statement that all the physical or physiological forces in the world can never adequately explain a percept or any other psychological datum. If they could, there would be no purpose in our having powers for the recording of cosmic properties. More to the point, common sense would have no reason of being if consciousness were a matter of physics, or if whole-making percepts could be accounted for in terms of pure physiology.

Let us consider again what St. Thomas has to say about our ability to know things as wholes. Whatever the nature of stimulus or nerve currents, the fact is that we are able to weave patterns out of the data of sense experience. Therefore, we must have a power of accomplishing a feat of this sort; and it is called common sense. It is both selective and unifying in its results. To quote: "Every outer sense knows how to tell its own proper objects apart. The eye, for example, can distinguish between white, black, and green. But, neither eye nor tongue can tell the difference between white and sweet; for, in that case, each sense would have to know both qualities in order to apprehend why they are not the same. Hence, the discernment of the different kinds of sensation that we experience must be the task of common sense, to which all knowledge coming from the outer senses must be referred as to a common goal."

Now, it is obvious that even the most ordinary *Gestalten* are patterned affairs. A patch of color on a background of white, a circle within a square, a tone in its musical setting, are sensed by themselves and brought into relation with their surround. Each set of stimuli represents an organized kind of experience. The same thing holds true for higher forms of synthesis. When we look at a painting, or study the blueprint of a building, or learn the melody of a new song, each individual part of the object in question is per-

ceived before it is knit, along with other parts, into a complex whole. In fine, the very facts that have led to the study of *Gestalten,* as synthetic achievements, help to strengthen St. Thomas's view that perception is more than a function of vision or hearing or any other outer sense; indeed, that the only way of accounting for it is to postulate a higher power which is able to fashion conscious wholes out of the impressions of all the external senses.

8. *Peculiarities of Perception*

Perception presents a number of problems that are somewhat off the beaten track of everyday experience. Because of their peculiar nature, they have given rise to a great deal of controversy as to their origin and meaning.

I. AMBIGUITIES

Using the same stimuli, it is possible to get two different sorts of conscious reaction. Thus, with the figures in our book, we notice a marked shift in perception when we continue to look at them for any length of time. Take the picture of the staircase as an example. At first glance, we have the impression of seeing it from the upper side. By and by, there is a change of awareness, and we seem to be viewing it from the under side. Thereafter, our perception moves back and forth between the two aspects. The Grecian urn shows how a figure may be reversed with its background. At first inspection, it reveals itself as a vessel of some kind. Then, as we keep on looking, it turns out to be two heads in profile, facing each other. In the same way, the star inside the hexagon changes into cubes. This asteroid figure is of interest for another reason, because it shows

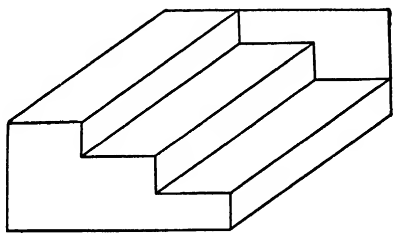

FIG. 17 The ambiguous staircase.

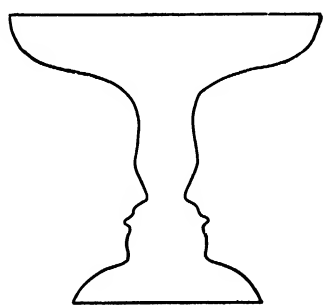

FIG. 18 The Grecian urn.

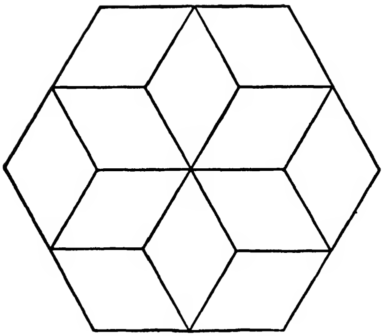

FIG. 19 The variable star.

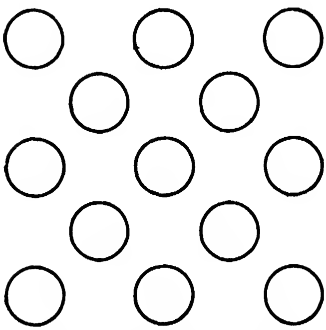

FIG. 20 Sanford's circle group.

how natural it is for us to see solid objects in any configuration that admits of such a reading. Sanford's figure adds a new feature whose perceptual value depends in some degree on the personal equation. Thus, we note at once that the drawing is not a continuous series of lines or elements, but divided into parts; and this makes it possible to get a variety of arrangements. Though the choice is fairly large, the general tendency is to group the circles in such a way that they come out in even forms.

Robert Woodworth has made a special study of all the oddities of perception; and he draws up a list of factors that lead us advantageously towards one kind of association rather than another. The first is *nearness* of elements to one another. Thus, we are naturally prone to form clumps of the trees on a landscape, or to cluster islands together when they are pictured on an expanse of ocean. A second factor is *similarity*. For example, if some of the elements in a figure are given the same color or shape, we are more inclined to see them as a group. A third factor is *continuity,* which may be lugged into a shapeless assembly of elements and thus provide a thread for hooking them together. Many picture puzzles are built up in this fashion. A fourth factor is *inclusiveness,* which gives a sharp advantage to some elements over others; so that those that do not fit into the scheme that we envision are simply left out of the picture—like stragglers in a parade. The fifth factor is *familiarity,* where things we are used to take precedence over things that are strange or uncommon. In this way we pick out a human profile from a confused array of lines or a shapeless mass of clouds. A

sixth factor is *expectancy,* which disposes us beforehand to see certain objects in the stimuli that are presented. If we are told, for example, that there is an old witch somewhere in the puzzle, our task of finding her is much easier than if we are simply asked to see what we can find. A seventh factor, not mentioned by Woodworth but suggested by Aristotle's laws of association, is *contrast,* where the very differences we find in elements is the reason we link them together. In this way, it seems natural to lay white against black, red against green, yellow against blue—not because they are like, but because they are unlike. The final factor in Woodworth's list is our *tendency to perceive things as a whole.* This sums up all the rest, in a sense; but it is singled out as a factor because of the special advantage it gives to parts that are perceived as elements of an integral pattern. In concluding our observations here, I should say that the foregoing list does not by any means exhaust the rich possibilities of association. Neither does it account for the peculiar turn that some of our experiences take. The fact is that each man is somewhat of a law unto himself as to how and why he perceives things as he does.

II. ILLUSIONS

Ambiguity in perception means that there are two ways of reading the presentations of sense, and that both can be right. Thus, the picture of the Grecian urn can also be interpreted as two faces in profile. Illusion, on the other hand, means that the data of sense are read in only one way which, it so happens, turns out to be wrong. We may define it as a mistake in judgment about the true nature of certain sensory elements within a given field of perception. Most errors of this sort, as we are all well aware, come from sensations of vision.

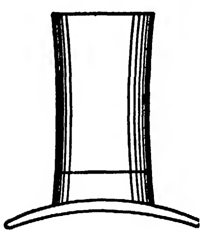

FIG. 21 Illusion of height. (Courtesy of the D. Van Nostrand Co., Inc.)

The case of the stovepipe hat is a case in point. Judging by appearance alone, one would say that its height is greater than the overall width of its brim. The reason is because the vertical part of the hat is placed at right angles to the middle of the horizontal part. Just draw two lines in this way and you will see what I mean.

The circle figure shows how interrupted

FIG. 22 Illusion of interrupted extent. (Courtesy of the D. Van Nostrand Co., Inc.)

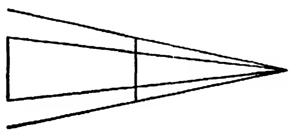

FIG. 23 Illusion of contrast.

extent creates the illusion of a smaller area than extent that is not interrupted. Though it does not seem so, the distance between the outside edges of the circles on the right is the same as that between the inside edges of the circles on the left.

The next figure is an illusion of contrast. The two vertical lines are of equal length; but the appearance of equality is easily destroyed when we add other lines, drawn from a median point at their side.

The pillar scene shows how parallel lines, transformed into solids, give rise to an illusion of perspective. The elements are the same as in the preceding figure; but now they are used to create a feeling of depth. In the world of reality around us, strange to say, we are not usually aware of these matters of perspective, though they must have a share in the growth of our perceptual knowledge. Thus, in watching a person approach from a distance, there is no special consciousness of his increasing in bulk or size as he draws near to us.

9. *Sources of Illusion*

Since illusion means error of judgment, it has more serious implications for the life of mind than mere ambiguity. How do we account for it? We can point to at least three factors that contribute to our mistakes.

The first and most fundamental factor is the *stimulus*. Things have a way of presenting an irregular aspect of reality to our sense organs. Why they should make one sort of impression rather than another, why, for example, they should appear crooked when they are straight, short when they are long, unequal when they are equal, and so forth, is a problem about which the psychologists have debated from time immemorial. The fact is, stimuli do give us misleading clues; and not much can be done about such deceptions except to prove them false by rule and measure.

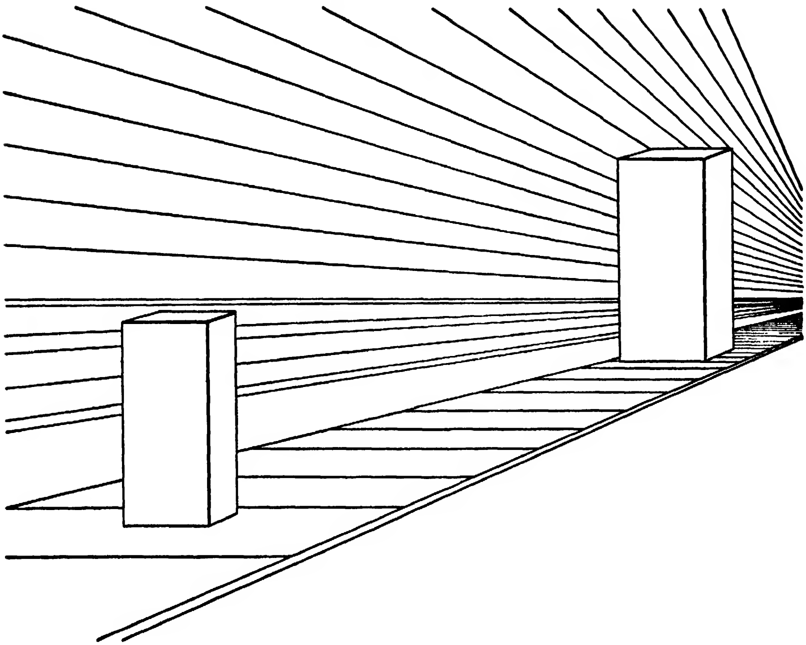

FIG. 24 Illusion of perspective.

The second factor is the *sense organ.* Perhaps it is in an unsound state and unable to function properly. Perhaps there is something missing in its physical make-up. We speak of a motor going dead on us. It is not impossible that the ear or tongue or tactual sense should play tricks like this on the unsuspecting mind; in which case the latter can hardly be held responsible for the wrong meanings that are given to the information it receives. Moreover, it is easy to see how physical shortcomings such as deafness, bad eyesight, color blindness, and even fatigue and general nervousness, might cause an imperfect awareness of stimuli.

The third factor is the *conscious state of the perceiver.* It may be that we do not allow enough time to get the right impression about what is striking the senses—like a person who is in such a hurry to eat his food that he can only improperly masticate and savor it. On the other hand, we may actually give so much attention to one element in a perceptual field that it gets out of balance

with the rest and no longer fits into the total picture. Again, there may be an unwarranted mixing of images with the concrete impressions of sense. Indeed, it is almost impossible to predict what the personal equation will do to a set of stimuli, how it will color them by its background, outlook, habits of feeling, thought, and so forth. Almost everyone has some sort of built-up attitude with which he regards the world around him. For example: suppose that before a stimulus impinges on my sense organs, I already have a lively expectancy that it will move me in one way rather than another, or give me this sort of impression rather than that. Then, in all likelihood, anything bearing even a faint resemblance to what I am looking for will be mistaken for it.

10. Illusion and Illation

For St. Thomas, of course, the point of major interest in illusions is how a mistake in sense gives rise to a mistake in intellect. Not that sense is able to judge the true or false nature of the stimuli that are affecting it! On the contrary, only mind can make such pronouncements. Yet, Aquinas is willing to allow that common sense does remarkable things. Like mind, it proceeds by compounding and dividing. And when it compounds and divides in the proper way, it is acting like mind when it judges aright. But sometimes it unites things that are separated in nature; or separates things that are united in nature. Then it is acting like mind when it judges awrong. The relation of common sense to mind, however, is more than one of mere likeness of action. Indeed, the knowledge we get by means of the former is the very stuff out of which our ideas are constructed; so that if something goes wrong with perception at the beginning, it may lead to bad thinking at the end of the line. Let us examine a little further into this unhappy possibility.

First, it is a fact that the outer senses now and then present their data in a way that is untrue. Thus, if I see grey when things are green, or taste bitter when things are sweet, then something has gone wrong with my organs; and the outer senses have failed me in recording their proper objects. Moreover, if I see motion in things that are at rest, or distance in things that are near, or largeness in things that are small, then my perceptual processes are out of tune with reality; and common sense has failed me in its proper objects. In this second case, Aquinas notes, the defect may

be due to one of several causes: either a weakness of the outer senses on which common sense depends for its perceptions; or the disordered fruits of fancy which confuses real with unreal; or the action of stimuli which present themselves to the senses in a way that is most unusual. As St. Thomas here observes, it is hardly the fault of common sense if the moon looks as large as the sun; to which we may add, that neither is it the fault of vision if a stick looks broken when partly submerged in water; nor of hearing if a whistle sounds higher when it is heard close up; nor of tactual sense if a pea feels like two peas when rolled between the crossed fingers. Surely, these are bewilderments of experience that must have a basis in the objects themselves.

Now, if all this is so, what are we to think of the worth of sense knowledge as a preliminary to the higher achievements of mind? Or putting it more bluntly: if the senses can be wrong, how are we sure that the mind is ever right in its judgments? The answer of St. Thomas is simple and straightforward: as far as they go, the senses are reliable witnesses to what goes on around us. Of course, there is a margin of error that creeps in here and there; but untruthful reporting is the exception, not the rule. Moreover, mind has ways of managing these exceptions. To deny the essential trustworthiness of the senses is to go against all the experience of mankind. More than this, it is to deny the possibility of both science and philosophy, since the finished fabric of these superior knowledges is woven out of threads supplied by the data of sense. Such is the practical realism of Aquinas who finds in sensation no more and no less than a response to stimuli acting on the body and known exactly as they affect our consciousness at the moment they are brought to bear on the organs of sense. The value of such knowledge, to be sure, is relative; and so it remains until mind takes a hand in the matter and gives it a quality of absoluteness by its power of penetrating to the nature of things.

11. The Rôle of Common Sense in Human Knowledge

To sum up and conclude our remarks on common sense: perception is a process wherein the elements of knowledge, given in sensation, are brought together and fashioned into complete experiences. It enlarges our field of awareness enormously. As a rule, the individual outer sense registers only a part of our cosmic environ-

ment, often a single detail. Perception is the process by which parts are joined to parts and made into conscious wholes. And the strange thing is that a conscious whole is really greater than the sum of its parts. It is common sense that furnishes this plus factor: giving oneness, perspective, and meaning to the discrete sensations on which it works.

Further, common sense primes us to think. Its synthetic accomplishments, in fact, are a prologue to what is to follow in the theatre of mind. Were it not for the perceptual material which it feeds to our higher powers, the whole business of thinking would stop short. Rather I should say: it would never begin. Thus, sense and intellect go hand in hand, working with mutual profit in the household of human wisdom. And so we say that for people who have reached the use of reason, to perceive is to take the first step on the road to generalized knowledge. Such is the nature of mind that when it comes in contact with something understandable, it cannot help but form an idea. Now, how does it get this impulsion to know, or how is it made aware of the impact of reality? Through the medium of common sense and its whole-making products. If I may use the expression, the percept is made to order for the functions of mind; and its very presence in consciousness is a challenge to our power of understanding. Thus, by adding insight to the data of sense, that is, by grasping the nature of what is presented in perception, we are able to extend the range of our knowledge infinitely beyond anything that the animal is acquainted with.

Finally, perception prepares us for action. We are born to live in the bosom of society; and our thoughts and ideals would be sterile, did they not become motives of outer behavior. Indeed, we should be like the tree in the parable that only encumbered the ground when it failed to bring forth flower and fruit in season. Now, the power of perception is uniquely located: between the sanctuary of mind, on the one side; and the world of reality, on the other. Its function is to disclose to us, for the first time, the universe of matter and men, filled with all manner of wondrous adventures; and by the knowledge thus brought into being, to dispose us to be up and about our affairs, to develop our talents, and then to lend an active hand in shaping the pattern of human events.

Chapter 15
IMAGINATION

1. The Meaning of Imagination

Experience tells us that we are able to consciously relive what has happened to us before. Thus, even though the object is no longer present to my senses, I can still picture it on the screen of my consciousness. All of us know what the colors of a sunset are like, or the sounds of a violin, or the fragrance of honeysuckle. We have learned by long use what the feel of water is, how walking and running affect us, what pleasure is to be found in a good meal. Now, let us presume that none of these things are within range of our senses at the moment. Nevertheless, we are able to bring them back by the simple act of imagining them. The only requirement for performing such a feat is that we first have perceptual contact with the things to be recalled.

Imagination may be defined as *the power of re-presenting to consciousness, in a concrete way, objects that have already been perceived but are no longer present to the senses.* As St. Thomas rightly observes, the fine things of life would not mean so much to us, if they always had to be experienced on the spot. To relieve us of this need and round out our knowledge, nature has equipped us with a power of picturing things in their absence. This, precisely, is the task of imagination. But we must not think that it works *only* when objects are absent. The fact is, the same impact of stimuli that moves us to perceive, also moves us to form images of the procedure. Were this not so, how could imagination go through its repeat performances? Moreover, what it brings forth so spontaneously must already be possessed; so that it can properly be called a storehouse of the forms it has received from the senses.

2. *The Psychosomatic Nature of Imagination*

Like common sense, imagination is a power of soul and body combined. St. Thomas is very clear in his teaching on this point.

I. THE PSYCHIC ELEMENT

First, there must be an *original impression* made on the end organs and relayed to common sense, before the imaginal process can be started. Further, there must be *retention,* on an unconscious level, of the effects of sensation and perception. This is what Aquinas means when he calls imaginal power a storehouse of the impressions made on sense. The forms preserved are the coin of the psychological realm, as it were, that it has minted for future use. Finally, there is the *conscious revival* of what has been previously experienced. As a rule, however, not all the details entering into the original impression are reproduced, since an image tends to be less vivid than a sensation or percept. On the other hand, the picture may be filled in with other features that do not belong to the original experience. This is probably why there is always a certain softness about images that is often lacking in the first impression on the senses. Rough edges have been worn away or sharp points toned down by some sort of selective activity on the part of imagination.

II. THE SOMATIC ELEMENT

On the organic side, our knowledge of what goes on in the nervous system when imagination is working has not advanced much beyond Aquinas's general statement that part of the cortex is involved. It is assumed today that all nerve currents which are to set up a perceptual process must lay down records in the brain. Following the lines of modern research, we can distinguish three types of cortical modification: *sensory traces* which are permanent changes in cortical substance, taking their form from the nature and pattern of the incoming impulses; *motor traces,* which furnish us with an enduring excitatory system that is able to reproduce the original configuration of motor discharges; and *sensori-motor traces* which link together elements of the two preceding records. Now, we may further take it for granted that all three kinds of traces, either separately or in combination, are concerned in the recall of images. Just

what this means from the physiological point of view is hard to say; but it would seem that some reappearance of the original nerve impulse is called for in the cortex. Moreover, each trace appears to retain its own neural integrity, in spite of the fact that the same nerve pathways and the same areas in the brain are employed to record a variety of impressions. It is unlikely, however, that the nerve currents that arouse a percept are rehearsed in their complete original form when the image of the perceived object is recalled.

3. *The Distinction of Image and Percept*

There are several ways of separating an image from a percept. For one thing, they are products of different powers; and so we should expect each to have its own special features. For another, the fact that one has to do with objects that are present, and the other with absentees, would seem to lend to each a peculiar psychological flavor. But the attitude of the experiencer also has a rôle to play in making distinctions; and it would appear that under certain peculiar experimental conditions (described on p. 188) image and percept can lose all their identification marks. In ordinary life, however, we do not have too much trouble in telling them apart.

The first differential is *strength*. Thus, the image never reaches the same degree of conscious intensity as the percept. We are accustomed to refer to the former as pale and feeble in comparison with the latter. This is natural enough, since the impressions we get from coming in immediate contact with a stimulus are much more forceful and lively than the imaginal forms of awareness that are only remotely connected with stimuli. Further, the vividness of the image is conditioned by the amount of attention that we give to the original experience, and by the number of times the perceptual process is gone over. The vividness of the percept, on the other hand, is not so closely tied up with such factors.

The next differential is *stableness*. As long as we continue to look at the lines on the palm of the hand, we have a clear perception of them. It is quite another matter, however, when we close our eyes and try to picture them on the imagination. Perhaps at first we have a fairly good likeness. But the longer we go on trying, the less certain the lines become in their general pattern. Finally, consciousness begins to waver between several kinds of images, among which those representing the palm appear only at intervals. How

different the case with common sense, where the continued impinging of stimuli merely serves to make a more solid and enduring reality out of the whole perceptual procedure.

The third differential is *completeness.* This is one of the commonest features of the percept; just as lack of it is a characteristic of most of our images. Thus, the contents of a percept are clear and minute in detail. Those of the image, on the contrary, are vague and at times unreal. But it should be noted again that all we have said about the image's being feeble, unstable, and incomplete is true only in a relative way, that is, when laid alongside the strength, constancy, and completeness of the percept. In practise, the difference between the two is resolved into an introspective attitude wherein we take over both forms of experience, weigh their objective and subjective aspects, and so make a distinction between them. Here the simplest rule of all, perhaps, is the one laid down by Aristotle: we can imagine things *whenever we wish;* whereas perception always depends on the presence of an object.

4. The Motor Effect of Images

If the sight of food makes the mouth water, the image of it can produce the same effect. So, too, with sex stimuli where emotions can be aroused and various bodily movements initiated by the mere picturing of an erotic situation. Here we are dealing with fundamental drives in human nature; and the motor results of images are mainly the outcome of reflexes that follow their course, despite any effort of the will to control them. But even with those muscles that are subject to command, the influence of images of movement is most remarkable. Picture, for example, a situation where you are walking along the edge of a very high building. At once the body becomes tense and quivering with excitement. A nightmare can bring about even more active results.

Perhaps the best instance of all of how our bodies are consciously patterned for movement by images is coming down stairs in the dark. Thus, there is one muscular set for descent; and another quite different arrangement for walking on a level. Now we imagine that we have reached the floor; and our muscles are relaxed accordingly. What a shock, then, to find that the floor was not there and that we had one step more to go before we reached the bottom!

One of the very obvious uses to which we put our motor images

is in the learning of muscular skills. Nothing is easier or more natural than to picture how the thing is done before we actually do it! It is not unlikely that most of the forms of outer behavior employ imagery of this sort in bridging the gap between theory and practise; or in effecting the passage from knowledge to movement. Moreover, in the formation of habit, for example, when we are learning to play tennis or golf, the task of motor images is not confined to the beginning of the process. Rather, they continue to give an initial push every time the skill is exercised, even though we are no longer aware of the details of bodily movement that the habit in question involves.

5. *Kinds of Images*

I. SENSE IMAGES

Any experience that has been aroused at the terminal points of our senses can be centrally reproduced in the form of images. It is rather unfortunate that we have only words like "image" and "picture" to describe the rich products of imagination; as though things *seen* were the only objects with which this most fertile of faculties is concerned. The fact is, of course, that images can arise from any of our perceptual processes—from touch, taste, hearing, and smell, as well as from vision. To be sure, some of these fields are better represented in consciousness than others. But all have their value for mind. Research has confirmed what we know from introspection: that images of taste, smell, and visceral movements are rather rare; whereas those of vision, hearing, and voluntary muscular behavior are plentiful. More interesting are the differences that arise from the personal equation. Thus, some people picture things seen better than things heard. They are good visualizers, and can bring back a face more easily than a name. Others have more success with things heard, and so become good auditors. Still others, especially those who have been deprived of sight and hearing, often show a most astonishing aptitude in the use of kinesthetic images.

Of all fields, that of vision offers the best material for study and experiment. The ink-blot test, for example, has been widely employed. Figures of varying shapes and sizes are spread out on a neutral background, and the subject is asked to name the objects or scenes that are suggested to his imagination. Readings from a wide

range of individuals have been gathered together, compared, and reduced to standardized form. They are now used as a basis for determining the preferences and even the character traits of people. Thus, those who favor color are inclined to be *emotional;* those who see movement tend to be *imaginative;* and those whose taste is for form and geometrical arrangement are regarded as *intellectual.* The test has also proved to be a valuable tool in the diagnosis of certain abnormal psychological tendencies.

II. EIDETIC IMAGES

When an imaginal experience is so distinct and realistic that it takes on the aspects of perception, we call it eidetic. In all such cases, however, the subject is fully aware that his images are not truly percepts. Erich Jaensch was the first to give scientific attention to data of this kind. They are of fairly common occurrence in children, where they show themselves in the ability to project images of an unusually striking and life-like nature. But now and then, they are found in the grownup: the type who is given to overmuch daydreaming; the builder of Spanish castles; the person who prefers the softness of fancy to the hardness of fact.

In the child, of course, the presence of eidetic imagery is part of his normal development; and while it is more marked in some than in others, there is no case where it need be regarded as out of the ordinary. The point is one of capital importance for parents to realize; and failure to grasp it may mean dismal mistakes in judging the motives of children's behavior. The true eidetiker is able to picture things with the most amazing completeness of detail. It may be the precise number of buttons on a policeman's coat; or of apples on a tree; or of whiskers on a cat's face. As often happens, the report of such particulars is unrelated to any nucleus of fact. The child is only imagining them; and he expects us to understand that what he describes is just a playful figment. Yet, the easy and convincing way in which he relates his flights of fancy often seemingly makes him out to be an exaggerator or out-and-out liar.

III. HALLUCINATORY IMAGES

The eidetiker knows that his images are not true percepts. The hallucinated person can no longer make such distinctions. His imaginal experiences are so vivid and real that he is utterly persuaded of their

objective truth. That is why they are often referred to as counterfeit perceptions. But they are not always abnormal. Our dreams are full of them; and they can be induced by drugs and excessive use of alcohol. It is only when they are present in the waking state, and apart from the use of pathological stimulants, that they may be taken as a sign of something mentally wrong. The hallucination, of course, is not the same as the illusion. The latter is a mistaken judgment in regard to things that are actually present to the senses. The former has no such perceptual basis. On the contrary, it supposes things to be acting on the end organs that simply are not there. One sees and hears and feels things that have no more existence than the smile of the Cheshire cat in Alice's wonderland. Psychologists have been curious to learn if a percept can ever be confused with an image. It would seem not, under ordinary conditions of experience. But by a special laboratory method, it was found that a person could be asked to project the image of an object on a screen; and that the image could then be replaced by the object without the subject's being aware of the change.

IV. HYPNAGOGIC IMAGES

The hypnagogic image is so named because it occurs in a state of drowsiness, where one is partly awake and partly asleep. This kind of experience may be thought of as a sort of transition between the world of reality and that of dreams. It is found either at the beginning or at the end of our slumbers; but for most people, the former is usually the period of richest hypnogogic imagery. Faces, scenes, events that have all the form and substance of real life arise within consciousness, sometimes without any effort of the will, sometimes in spite of it; and they may take on so startling a vividness as to have all the earmarks of an hallucination.

6. The Dream

Men have always attached a special significance to their dreams; and the amount of argument that has gone on about them, from Aristotle's time down to our own, would fill a library with books. There are two angles from which the study of them may be approached: one, their cause; the other, their meaning.

I. STIMULUS

A sleeping person may be subjected to a variety of stimuli, such as lights, sounds, odors, pressures, and so forth. Some interesting results have been secured. Thus, a touch on the forehead may cause one to dream of an insect's bite, a headache, or a slap on the face. Uncovering parts of the body and exposing them to a draft of cold air is followed by dreams of mountain climbing, wading through streams, or nakedness. A flash of light or the dropping of a book may bring on dreams of a storm. Apart from such artificial means of stimulation, the condition of the body itself often has much to do with the types of imagery experienced in our slumbers. Cramped muscles, poor digestion, or colic can be fertile sources of nightmares.

The recency of the stimulus is closely connected with the kind of dreams we have. As a matter of fact, it will be found on a little consideration that most of our dreams are drawn from events that occur not long before we fall into slumber. Thus, if we are looking at the pictures in a book, imagination is actively set to be occupied with such things in our dreams. This is also true of a train of thought, especially one with an emotional setting, which is often carried over from waking to sleep. We do not mean to say, however, that our dreams have no causal connection with things in the past, because sometimes they deal with happenings so remote that we have long since forgotten about them.

II. INTERPRETATION

While most of the facts just mentioned are commonly recognized by psychologists, it is quite another matter when they try to give meaning to the events of our dream life. Foremost in the field of modern interpreters, of course, is Sigmund Freud, with his theory of wish fulfillment. In its general outlines, I should say, the explanation of the famous Viennese doctor seems to be borne out by actual experience. For example, a child who has been allowed just one piece of candy on going to bed, awakens in the morning to say that he dreamed of eating a whole dishful. This is fundamentally the same sort of wish fulfillment that we find in ourselves when we wake on a cold winter morning and feel reluctant to rise, then fall asleep again and dream that we are already up, dressed, and busy with the tasks of the day.

But Freud's account is much more complicated than this, and overlaid with all sorts of finely-shaded nuances of meaning. As he points out, one of the commonest aspects of our dreams is their grotesqueness and distortion. This is merely a cover for desires that, in conscious life, would be unpleasant or shameful. Refusing to think about the forbidden fruit does not cast out the desire for it. On the contrary, it continues to influence us in an unconscious way, and forms the latent content of our dreams; just as the grotesqueness we spoke about a moment ago forms their manifest content. In sleep, the repressions of the waking state are lifted, and a vicarious satisfaction achieved. Moreover, each repression really stands for some sort of sexual desire, according to Freud; and so the distorted elements of the dream are simply signs or symbols of sexual repression.

In spite of the fact that the word "sex" is used by Freud to cover every sort of animal love—the desire for food, for example, as well as the desire for things concerned with reproduction—his theory has been roundly criticized on this particular point. Most pyschologists hold to the view that any kind of unpleasant desire can be repressed. In short, the essential sex core of the Freudian theory has been challenged. Still, there is general agreement that unsatisfied wishes can and perhaps do motivate most of our dreams; and further, that the warped and distorted nature of dream imagery may be due, at times, to the very intenseness with which we try to crush down our desires.

7. *Reproductive and Creative Imagination*

The distinction we make here between the simple reproductive tasks of imagination, and those that are productive or creative in nature, goes back to Aristotle.

Reproductive imagination pictures objects and events just as they happened. Its work is to give us faithful copies of actual experience. If one is asked to recall the appearance of an egg, a triangle, a violet, a shepherd dog, or the Big Dipper, the mere mention of the names is enough to bring back an image of these things. It demands no special effort, no putting together of elements of experience, no control of the will or active search for novel arrangements. The picture is present to imaginal power just as it exists in fact and reality.

immaterial concepts. Just how it is done will be seen in a later chapter.

Speaking more concretely of its picture forming power, imagination is a most valuable asset in the solution of certain kinds of problems. Take a case like the following. A three-inch cube, painted on all sides, is divided into smaller cubes of one inch each. The question is: how many cubes have paint on three sides? And after we have the answer to this one, the next query is: how far would we get with problems like this, did we not have imagination to show us the material and appeal-to-sense aspects of cosmic things?

Moreover, since imaginal power is able to create, it has a rôle to play wherever the mind must project itself into novel situations or come to grips with factors it has never encountered before. The example of the inventor will illustrate the point. Before he can take a single step towards the discovery of a new device, he must have some kind of picture in consciousness of the goal to be reached. Images are called up and passed in review, but always with an eye to those that are most likely to help him in realizing his objective. There is a long and tedious sifting of results, the patient endurance of the stages of trial and error, the search for new combinations with perhaps the expectancy that chance or good fortune will favor the outcome, until finally an arrangement is fixed upon because it best represents what the inventor is after. The same sort of imaginal activity is present in all creative achievement—that of the artist and writer; of the scientist and even the philosopher who, as St. Thomas tells us, must always keep referring back to the humble pictures of imagination even in his most sublime passages of abstract thought.

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Chapter 16

MEMORY

1. The Notion of Memory

Although imagination is able to recall things from the past, it does not recognize them under the aspect of pastness. For example, it is one sort of experience to picture an orange, but quite another to remember the last orange we ate. In the first case, there is no historical context for our image. In the second, what is pictured is definitely linked up with a time in the past. Now for St. Thomas, this act of dating things is enough to warrant the supposition of a new and special power; and so memory is entered on the list of the inner senses. We define it, according to the teaching of Aquinas, as *an ability to recall events of the past and to recognize them as past.* At the same time, it must be made clear that this added excellence of nature is also shared with the animals. The very fact that our knowledge is of the past as past is proof, says St. Thomas, that memory is a power mixed with matter, and, like the rest of our senses, concerned with the here-and-now aspects of things. With mind, on the other hand, there is no limitation to past, present, or absent, since it is able to lift itself above the dimensions of space and time.

2. The Psychosomatic Nature of Memory

Memory in the strict meaning of the term, that is, as a power of recalling the past as past, can belong only to a composite creature. As we shall later on see, mind also has a recollective function; but this does not imply the existence, on the intellectual level, of a separate faculty of remembering. Because sense memory is a mixed power, it has features that are both psychic and somatic.

I. THE PSYCHIC ELEMENT

From the point of view of knowledge, memory makes the same demands on us as imagination. First, ~~then~~, it is necessary to suppose an *original impression,* with some effort at fixing the experience in consciousness. This is what the moderns call the learning stage of the process. Next, there must be *retention,* in the form of images, of what we have perceived. This might be thought of as the thesauric function of memory, since it means that pictorial records of experience are stored away for future use. The third phase, ~~of course~~, is the actual *restoration* of past events within the field of awareness. Thus far, we notice no particular differences between imagination and memory; and so it must be in the fourth property that the two powers are formally separated. This new attribute, as we said at the beginning, is the ability to identify our present state of consciousness with some experience that has occurred before; in short, to put the memory image in its proper historical setting.

The moderns make a distinction between *recognition* and *recall* in the remembering process. In the first case, we have a stimulus to jog the memory; in the second, there is no such help. For example, it may be easy enough to pick out Thomas Jefferson from a series of presidential pictures; but to recollect what he looks like, without the aid of the pictures, may be beyond our efforts. Several reasons are brought forward to account for the difference here. It may be that the event we are trying to remember is very involved and full of detail; or that it happened a long time ago; or that it has not been rehearsed very often; or that the will to fix it at the moment of original impression was not too strong; or that it has got confused with other impressions. All these are factors making for difficulty of recall; but they do not have the same blocking influence on recognition.

II. THE SOMATIC ELEMENT

From the findings of science, it is easy to see how memory depends on the brain. Even without the benefit of the vast programs of research that are being pursued today, St. Thomas was well aware of the basic relation of memory processes to the cortex. Thus, seven centuries ago he pointed out that lesions of cortical substance, or temporary conditions of stupor brought on by drugs, may have a

decided effect on both imagination and memory, and actually prevent the recall of previous knowledge.

Although we have no direct evidence of what transpires in the brain during the first stages of learning, it is fairly certain that the same kinds of traces are laid down as those for imagination, mentioned in our last chapter. These traces are not, of course, pictures of external events, but rather a patterned series of nerve processes that take place in particular parts of the cortex. The fact is, we have as many different types of memory as there are differences in the ways we perceive things; and each type must be associated with its own complex arrangement of nerve cells in the brain. The assignment of particular types of memory to particular areas is also founded on close study of the effects of injury or of complete disintegration of parts; though this is not to say that the memorial tasks, thus deprived of an organic basis, may not be taken up and developed in another part of the cortex. Nor need the relearning be thought of as a specially difficult affair, since it is now known that memory can record a secure and lasting pattern on the tablet of the brain within a few moments of its receiving new impressions.

The important thing to stress here is that memory is not a purely biological affair, as some of the material-minded scientists of the nineteenth century held. No amount of knowledge about nerve currents or brain potentials, for example, can explain the phenomenon of conscious recall. As Sherrington, speaking of the rise of nerve stimuli to the level of knowledge, frankly admits: a change is wrought "wholly unlike any which led up to it, and wholly inexplicable by us." The trouble with most of us, he goes on to remark, is that we are too accustomed to the miracles of consciousness to be very much impressed with their non-biological elements. Instead of feeling startled at what our senses do for us, we are not even mildly surprised. And this, note well, from one of the greatest physiologists of our time! On the other hand, it must be admitted that memory does depend on the brain: first, from a structural standpoint, through the presence of traces or cortical patterns that determine the nature of the memory record; secondly, from a functional point of view, through the repetition, at least in part, of the nerve activities that went along with the first tracing of records. Both conditions have to be fulfilled before we can consciously restore any fact from the

past—indeed, before we can call into play any of our image-forming powers.

3. *Memory and Reminiscence*

Following Aristotle, St. Thomas distinguishes two kinds of memory processes in man. The first is *simple recall,* and is common to both man and animal. The second is a strictly human achievement, made possible by the fact that memorial power can receive light and guidance from reason. This is the same sort of difference that we found in our imaginative processes. When memory, in its movements, is controlled by the higher forces of mind and will, it is called *reminiscence.* Aquinas compares it to inference, because of its resemblance to those mental procedures by which we pass from what is already known to what is unknown. Thus, by using some sort of methodic device, such as forming syllables from the letters of the alphabet, we can arrive at a forgotten name. Hermann Ebbinghaus, who wrote one of the modern classics on memory, has preserved the Aristotelian teaching in his distinction between experiences that are brought back to consciousness in a purely natural and spontaneous way, and those that are recalled only by a voluntary or rationally controlled process.

4. *The Laws of Association*

Memory does not work at random, as we soon find out on close examination. Even in the ordinary forms of recall, there is always some connection between the images that are brought back to consciousness. According to St. Thomas, the clue to this connection lies in the native tendency of our image-forming powers to reproduce the presentations of sense in the order of their first occurrence. Thus, it is usual for us to perceive several objects in a given experience; and each object makes an impression on its proper sense. Now, all this is laid away in a set of images that are tied together in the chambers of memory in the same way that the objects they picture are associated. And so it is only natural that the recall of one image should have the effect of restoring many or even all of the other images to consciousness.

Using the rules of Aristotle as his guide, Aquinas notes that the process of recollection usually advances along a time-series of

events, starting with those that are most recent, and gradually going back to what is more remote. Next, he points out the three kinds of relationship by which memory is influenced in its revival of images. These are Aristotle's well-known laws of association. First, the *law of similarity* simply expresses the fact that like suggests like. When we think of Socrates, for example, it is easy to think of Plato, since both were learned Greeks. Next, the *law of contrast* states that like has a way of suggesting unlike. Thus, the mention of Hector's name may bring back the memory of Achilles, since one was the enemy of the other. Thirdly, the *law of proximity* says that what is near something else may cause an association. The nearness may be one of time or place or kinship. In this way, for instance, a birthday may be connected with the season of lilacs; the image of a town may suggest that of the river on which it lies; and the memory of a son may call up the image of his father. Perhaps we might express all three laws more simply by saying that *when part of a previous experience is remembered, it tends to recall the remaining parts.*

Modern research has confirmed the introspective findings of Aristotle and St. Thomas. But it has also called attention to one or two points which were undeveloped in their writings. For example, it would seem experimentally certain that memories now and then appear in consciousness without any special reason for their recall. They are called free-rising images. But since they are so rare as to form exceptions to the rule, they only confirm the general regularity expressed in the laws of Aristotle. Another fact of interest revealed by the methods of the laboratory, is the perseverative tendency of memory. It was first reported by Georg Müller some fifty years ago, and may be described by saying that *an image which has once appeared in consciousness is apt to become conscious again very soon.* The chief importance of perseveration is in its meaning for study and learning, as we shall see in the next section of our chapter.

5. *The Process of Learning*

Memory furnishes us with one of the most prolific sources of experimental data. The main fields of analysis are *learning, retention,* and *association.*

I. CURVES OF LEARNING

From the point of view of memory, learning is a matter of storing away original impressions in the form of images. What the experimenter tries to do is to find out how we progress over a certain period of time; what proportions of the materials are mastered in different time intervals; and the conditions that affect the shape of the curve which is plotted to represent the whole procedure. The learning curve, as we see from our figure, may take any one of three directions. First, it may show negative acceleration; in which case, the subject acquires more of the material in the first part of the learning period and less in the last part. Secondly, it may be turned the other way about and show positive acceleration, when the subject gets off to a slow start but manages to increase his mastery as he draws near the end of the learning period. Thirdly, the curve may combine two directions of movement: beginning with a positive drive and indicating improvement as the learner goes along; then reaching a point where efficiency starts on a steady decline. With the general run of students, this third type of curve is the one that is followed.

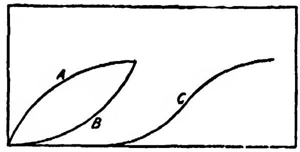

FIG. 25 Curves of learning. (Courtesy of John Wiley and Sons, Inc.)

II. THE SUBJECT MATTER OF LEARNING

It has been found that meaningful material, such as a passage of prose or poetry, is more readily committed to memory than non-meaningful material, like the nonsense syllables of Ebbinghaus. The advantage of the former lies in its associational value, which means that it is already partially known before the learning period begins. But the latter offers a better clue to the natural strength of memory. The student can make the comparison for himself by noting the time it takes to learn the following verses—the first an excerpt from the witch's curse in *Macbeth,* the second a sample of rhymed nonsense material, made up by Philip Ballard:

I will drain him dry as hay:
Sleep shall neither night nor day

Hang upon his pent-house lid;
He shall live a man forbid.

. . . . . .

Som lep raccal nes lo tad:
Beslo delpit fixil nad
Tamp rilk, lectom bish;
Entoc tiplam in sal rish.

III. THE LEARNER

Every good master knows that no two of his pupils are alike in their abilities to learn. As star differs from star, so one human being is set off from another in the matter of natural endowment, as well as in the way talents are used.

First, then, we have the problem of *individual differences.* This is an inevitable fact of nature; and its clear recognition at the outset will save many a heartache as well as headache. Brought down to simple terms, it means that variations occur not only in respect to certain powers among the members of a group, but also as regards different powers in the same person and even the same powers at different stages in the growth of the same person. Thus, the ability to learn by rote varies from individual to individual in a class of students. Moreover, memory may be good but intelligence poor in the same individual. Finally, memory may be well used and capable of outstanding work when one is young; then grow rusty for lack of practise as one leaves off the habits of the classroom.

Next, *age* presents a most interesting field of research; and the results of experimentation run flatly counter to the popular opinion that the power to memorize declines very sharply with the mounting of the years. True, as we said a moment ago, it is possible that we should lose our skill through failure to exercise the power; but the same might be said of the best piece of machinery which is left to dry out and corrode over a long period of time. There are several reasons, however, for the mistaken view that most people have about memorial power. One is that adults usually do much less word for word learning than adolescents; and so they lose the advantages that come from daily practise. Again, adults have no particular incentive to master things by heart; and their enthusiasm for such tasks falls far below that of a younger person. Moreover, if one is really convinced that he is no longer able to perform the feats of his school

muscular sense—is the way to get most from our efforts to learn.

A further clear finding from the workshop of the scientist is recognition of the fact that *memory is not conditioned by intelligence.* That is to say: from a person's success or failure with materials to be memorized, it is unsafe to infer anything about the extent of his rational insights. Indeed, most mental testers are agreed that a deduction of this sort is not possible, since we are dealing with faculties that belong to different orders of being. There is no question, as Charles Spearman points out, that it is easier to learn by memory than to grasp meanings with the mind. And he goes on to say that memorial power is responsible for many of our errors, mixing up items of past experience, putting images in the wrong context, assigning them to places where they do not belong, and so forth. In this connection I should also like to add that memory cannot and never was meant to solve our ideational problems. Its real rôle, as St. Thomas insists, is to enlarge our experience by the wealth of its imagery; to furnish mind with matter for thought; to combine its products in new and helpful ways; to offer examples in the concrete of what we are trying to understand in the abstract. But to ask it to think for us is like asking our pet dog to do our homework in geometry or calculus. Moreover, it is no special compliment to mind when, in answer to its rational questions, we run straight to memory; and unlocking its doors, draw forth some threadbare formula that has long since lost all touch with reality. Yet how many of us resort to such dodges, when what is called for is hard, honest thinking through of our problems! As we remarked at the beginning of our book, anyone skilled in the use of memory may become a first rate student of philosophy or psychology. But only those who are willing to wrestle with their ideas, and who come to their own personal conclusions about the cosmos and human nature, will ever merit the name of philosophers or psychologists.

Last of all, the *intention to learn* can play an important part in our memory work. Such a factor, to be sure, is found only in man, whose senses are subject to higher levels of control. What it means in this case, is that will takes a hand in the matter: keeping close on the heels of memory; bolstering it up when it wavers or lags; pushing it along till it reaches its goal. Emotion, in turn, can be an asset to will, provided it is set in the direction of the goal; just

as the prospect of praise or reward can give tone to emotion. But it happens sometimes that our feelings are unseasonable or out of line with the movements of memory; and then they are hindrances to the process of learning. Anxiety, excitement, fear of punishment or of incurring the displeasure of one we love or respect, all form an emotional background that is highly unfavorable to the free use of memory.

IV. THE LEARNING PROCESS

The best methods and conditions of study have been tested out in the laboratory, and the results are worthy of our serious consideration.

First, it has been established that *spaced practise* tends to bring about better effects than a haphazard distribution of the time given to learning. The optimum length of the rest period between our memory efforts is roughly equal to the time it takes to learn an assignment. This has been explained in several ways; but the best account, perhaps, is the one that traces the favorable outcome of equal spacing to the perseverative tendencies of memory, mentioned on a previous page. We know from experience that memory does not shut up shop and stop all its work when the formal task of learning is over. On the contrary, the important job of getting our images shaped and fixed into definite arrangements and even shifted about so that they can take a new and more natural form, is carried on in large measure on an unconscious level. Were this not so, how should we ever explain the fact that so many of our problems are solved by sleeping on them? Indeed, one of the best times for learning is the period just before going to bed. Thus, rehearsing a lesson or a speech the night before a public appearance is worth double the time and effort spent on it the day of actual performance.

Again, the problem of *whole versus part learning* has been made a matter of thorough research; but here the evidence is not so conclusive. For example, in committing a poem to memory, some students prefer to master it line by line, and actually do better by this method. Others find it easier to repeat it from beginning to end. Of course, if the material to be mastered is of fairly short length—say a few lines of prose, or a single stanza of poetry—then it is very obviously unimportant which device we follow. Age, too, may have

an influence on our choice, since the older we grow the more skilled we become in visualizing things in a larger perspective. Moreover, some people are endowed with such strong powers of retention that one or two readings are enough to fix even lengthy material. St. Thomas seems to have had such a gift; for, he confessed towards the end of his life that he never forgot anything that he studied. But his memory was also well trained; and that is another point to be considered in the matter of learning. However, since tastes and abilities and topics to be learned vary so widely, there is no way of telling what is best in this question of whole against parts.

Next, the comparative merits of *recitation versus nonrecitation* have been looked into, with the evidence in favor of the former. Nor is the reason hard to find. Thus, when a student has recited to himself before he comes to the classroom, he has the advantage of three solid gains. First, he has discovered beforehand what is easy, middling, and hard in his task. Secondly, he has rehearsed his lesson with a clear, conscious focus. Thirdly, he has given his material the form it must take at its final reproduction. With the knowledge thus acquired, and with a sensible appreciation of his strong points and weaknesses, he can balance his efforts with a view to complete mastery. Such is the secret of every good recitation, brought to light by research, but really known all along from experience—like the wisdom of the proverb which says that the proof of the pudding is in the eating.

Finally, there is the problem of *rhythm*, which here refers to the flow of cadences in the spoken language. It may be adapted to almost any type of material, from the simple stories that were told to us in the nursery, to the most heroic epics of history, such as Homer's *Odyssey* or Virgil's *Aeneid* or the great Spanish *Cid.* Even the dry-as-dust rules of logic have been submitted to this kind of treatment—with happy results for the budding logician. In all cases, rhythm gives an overwhelming advantage to anything that has to be learned by heart; and its suppression may prove a real stumbling block to many young people. Both rhythm and rhyme find a natural use in music; and one of the easiest tests of their value for memory is in trying to recall the lines of a song without the air that accompanies them. Thus, the serial recurrence of time intervals, marked off by words or phrases run together, seems to be built into the very fibers of memory; so that without the rhythmic context in

which the words of the song are learned, it is very hard to restore them to consciousness.

To sum up, then: from a consideration of all the foregoing factors, we may safely infer that our memorial output is much improved by bettering our habits of study—though most psychologists hold with James that the faculty of remembering, as part of our natural endowment, has a quality that is fixed and unchanging after a certain age is reached. But habit can work wonders in increasing efficiency; and it is possible that one with a lesser gift, by dint of constant practise, should actually accomplish more than another who has a greater gift but fails to use it properly. Even the extraordinary performances of the so-called memory experts are to be accounted for largely in terms of the training they have imposed on themselves. The findings of the experimenters, without exception, point to the fact that memorial power can make substantial gains in all directions by the use of comparatively simple methods of drill.

6. *Retention*

In the laboratory, *retention* means the measurable amount of persistence that occurs with the materials committed to memory. It is contrasted with *forgetting*, which means the failure of these materials to appear under experimental conditions. The fact that we are unable to remember everything that falls within range of our experience has its good points as well as its bad ones; and all in all, it is just as well that nature has arranged things in this way. Certainly there are many unpleasant and even tragic events in life that are best consigned to oblivion.

Forgetting is really an expression of the selective activities of consciousness. It is a sign that memory, for some reason or other, is not disposed to recall an item once known. We may explain it in a physiological way by saying that it follows from the dropping out or disappearance of cortical records; or, where it is only temporary, from some interference with the nerve processes that go along with the act of recall. But this is only stating the issue in neurological terms; and besides, we know next to nothing about what actually happens in the brain when we forget. I am referring here, of course, to normal failures of remembrance, and not to such as are the effect of injury, decay, or the use of drugs. Let us try, therefore, to approach the problem from the cognitive point of view—or as

an aspect of knowledge—by stating the psychological factors, that have an influence on our power of retention.

I. THE CURVE OF RETENTION

The curve of retention is simply a convenient device for showing what happens to the things we memorize, after the formal learning period is over. The classical shape of the curve was given by Ebbinghaus; and its soundness has been confirmed by the work of later investigators. It falls rapidly during the first twenty-four hours that follow the close of the learning period, drops very slowly during the second twenty-four hours, and then is scarcely noticeable in its decline after that. This would imply that most of what we are going to forget is forgotten soon after we learn it. A partial exception to the usual shape of the curve is found in reminiscence, where memory seems to improve without practise. But reminiscence, in its modern technical meaning, can occur only with partial learning, since complete mastery would allow no room for improvement of this sort. Why it happens at all is one of the mysteries that science has not solved.

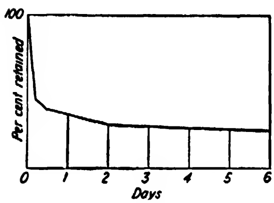

FIG. 27 The Ebbinghaus curve of retention.

II. RETROACTIVE INHIBITION

Learning, as a feat of memory, takes place when images are grouped together in a way that adequately represents the material to be learned. Now, it has become very clear from long research that an association formed in a later part of a learning period can seriously impair another association belonging to an earlier part of the period. This curious kick-back, so to speak, of one set of materials on another, is known as *retroactive inhibition.* At least three reasons can be advanced for its presence.

First, the materials can be so alike as to cause mingling and confusion. In the following chart, we have used the examples of Latin and French which, from the point of view of origin, are related to each other as mother and daughter. The ground of their similarity, therefore, is very strong. Latin and Logic, on the other hand, have no special connection.

9.00	9.30	10.00
Study	Study	Recite
Latin	French	Latin (a)
Latin	Logic	Latin (b).

The difference between (a) and (b) shows the amount of retroactive inhibition that is due to similarity of materials.

Secondly, the materials may not be properly spaced during the learning period. In the two charts that follow I have indicated how separation is secured, either by allowing a time interval to elapse; or where this is not feasible, by placing unlike material between like.

9.00	9.30	10.00
Study Latin	Rest	Recite Latin (a)
Study Latin	Study French	Recite Latin (b)

The difference between (a) and (b) shows how much retroactive inhibition has come into play due to lack of spacing by a time interval.

9.00	9.30	10.00	10.30
Study	Study	Study	Recite
Latin	French	Logic	Latin (a)
Latin	Logic	French	Latin (b)

The difference between (a) and (b) shows how spacing, by the interpolation of unlike materials between like, has reduced the amount of retroactive inhibition.

Thirdly, inadequate practise, or a low degree of learning, is perhaps the most basic factor of all, disposing towards the appearance of retroactive inhibition. This means, in effect, that when our grasp of the data to be memorized is only slight, we retain only small amounts. Accordingly, the likelihood of dislodgment becomes

much greater. It is a matter of everyday experience that badly learned lessons have a way of getting tangled up with one another, and that parts of one lesson can act as blocks to the recall of other lessons. When we think of the different kinds of images that go into the learning of any single topic, the marvel is not our forgetting so much, but the fact that we can remember anything at all! Certainly there is every reason for availing ourselves of all the insights that science reveals in order to better our habits of study.

III. CHANGE OF BACKGROUND

The process of memorizing has two sorts of background. The first is extrinsic and embraces such factors as the place where we study, the books we use, the atmosphere our teachers create by look, tone of voice, gestures, manner of explaining things, and so forth. The second is intrinsic and includes matters that have a real bearing on the success of our work, such as our health, state of freshness or fatigue, posture, hunger, feelings of strangeness or familiarity with our surroundings, and the like.

Thus, during the whole learning procedure, the student is unconsciously forming strong associations between the images of what he is memorizing, on the one hand; and the various elements of background which we have just mentioned, on the other. So true is this that if learning has got no farther than the threshold of mastery, and if certain of these environmental features are changed, it becomes almost impossible to recall. A pupil, for example, may experience a real trial in remembering, when his examinations are held outside his own classroom. And even the teacher must admit that he recalls things more easily when working under uniform conditions: in his private study, let us say, and at the desk and among the books that have grown to be part of his very personality. Indeed, the influence of environment may be so solid and strong, that to change or reverse it, or seriously tamper with its usual pattern, may interfere with a whole system of knowledge. I have in mind the case of the American who had spent several years in China and was able to speak the language with ease and fluency. On coming home, however, his skill rapidly faded, so that finally he was unable to remember even the simplest idioms. Then, with his return to China and to the familiar setting where he had learned the tongue, his mastery of

Mandarin was restored almost overnight. All of us, perhaps, have had experiences of the sort.

7. *Association Tests*

It is possible to gage the general outlook of a person, and even some of the features of his character, by the way he associates his memory images. This kind of research was begun by Francis Galton and developed by Wilhelm Wundt, with stress on the cognitive aspects of the problem. Later on, Carl Jung undertook a long series of studies on the relation of feelings and emotions to the associative process; and the results of all these experimental labors have been standardized in tests that have become the stock in trade of every modern psychologist.

As an example of how they work: a subject is given a list of words and asked to reply to them as quickly as possible with the first word that occurs to him. A wide variety of answers have been noted; but most of them may be grouped under three headings: matter of fact, which are taken as signs of an *intellectual* outlook on reality; verbal, pointing to an *imaginative* approach; and emotional, which indicates that a person is prone to look at things with special reference to their *appetitive* tones. The reaction may be delayed, as though the subject were trying to avoid some unpleasant association, or conceal the natural trend of his imagery. In some cases, he may not answer at all; so that it is necessary to repeat the stimulus word several times. Again, his reply on a second use of the test may be different from his first. The value of a technique of this kind depends, to be sure, on the care and precision with which it is used, as well as on the insight of the tester who is to give the final interpretation to the answers of the subject. While not infallible, then, the association test is undoubtedly a useful psychological tool for probing the interior of man and showing the nature of some of his underlying tendencies.

8. *The Rôle of Memory in Mental Life*

In the psychology of St. Thomas, the images of memory have the same whole-making value for mind as those of imagination. Each is the *germ of an idea;* each is a picture of some concrete datum of experience from which mind can abstract a generalized form of knowledge. Indeed, without such images, there would be no under-

standing at all, since they are related to reason in the same way as sensible objects are related to sense. Now, there would be no seeing without light; and just so, there would be no movement of mind, were there no images to act as a stimulus to thought. Aquinas is very insistent on this point.

But the work of memory is much more significant for mind and its intellectual habits than the work of imagination. For one thing, it is not such a random affair; for another, it is not so far removed from the world of reality. Its business is to bring back the events of the past, not as imagination capriciously pictures them, but just as they happened in fact and in truth. Moreover, as Aristotle remarked some twenty-three centuries ago, "Experience comes from much memory"; and since art and science and all other forms of human knowledge take their start from experience, the rôle of memory must be unique indeed! That is why Aquinas is so interested in its training—not for what it is in itself, since it is only a sense, with all the material qualities of the rest of our senses; but for what it can contribute to the life of mind.

9. *The Rules of Good Memory*

St. Thomas's rules for the cultivation of a good memory are so simple and natural that one may easily overlook their scholarly source. Yet, they are the fruit of the wisdom of one of the world's greatest thinkers; and the brain that gave birth to them was a prodigy of retentiveness. To give them a touch that is slightly more modern, I have taken the liberty of changing their order.

First, then, we must *launch into our task with a real will-to-learn;* or as Aquinas puts it: "We must be anxious and earnest about the things we want to remember." This means that the more deeply an object is impressed on our consciousness, the less liable it is to slip away from us. And here the Angelic Doctor quotes Cicero, who says: "Anxiousness [to learn] keeps the figures of images whole and entire."

Next, we must *carefully consider and set in order the things to be memorized.* In this way the pattern of reason, which is the proper principle of order, is stamped on the matter we are studying. Thus, with the superior glance of the mind, we are able to build up logical connections that are wholly beyond the powers of sense.

Further, we must *search for good illustrations of what we want to*

Chapter 17
ESTIMATIVE SENSE AND INSTINCT

1. *The Power of Estimation*

Because nature never fails us in matters of urgent need, we have another inner sense that is concerned with our biological welfare and survival. It is called estimative power; and its task is to tell us what is good or bad for the organism. But, since reason, too, can supply us with this knowledge, the sense of estimation does not have the same meaning for us as it does for the animal.

I. IN THE ANIMAL

Aristotle was so impressed with the play of estimative power in the brute kingdom that he usually referred to it by the simple name of "nature." This is perhaps as good a word as any to describe it, since both the power and the knowledge it produces are present from the beginning. For St. Thomas, too, its possession spells the difference between life and death. How explain it? There is really no explanation—except to say, with the Angelic Doctor, that it was part of the plan of the Creator when he furnished the animal with the psychological tools necessary for its existence. Thus the bee builds its hive, and the bird its nest, with the unerring sureness of a master craftsman; and the products of their labors are just as practical for their purpose as man's artifacts. Again, the deer flees from the lion, and the lamb from the wolf, with the same panic fright that impels us to run from a madman; because a glance, or a sound, or an odor, in each instance, is enough to arouse an awareness of terrible danger. Now where do these creatures get their information? Not from study, or practise, or watching others to see how it is done. Not from experience or reflection or knowledge passed on by their

parents. The only thing left to say is that it is present from birth; and all that is needed for its use is the physical unfolding of the animal's body. This, then, is what St. Thomas understands by the estimative faculty; and we may define it as *the power of sensing, without previous experience or training, the things that are useful and harmful to the organism.*

To give a fuller account of the teaching of Aquinas, we note, first, that estimative is a power of forming images; or better, a power of bringing to the surface of consciousness, images that are already formed at birth. The fact that they are innate at once sets them off from the products of both memory and imagination. But there is another feature that distinguishes them from other kinds of images. Thus estimative sense, according to St. Thomas, deals with what he calls the "insensate qualities" of objects, that is to say, their aspects of usefulness or harmfulness. Insensate, therefore, does not mean that the quality in question is not capable of being sensed, but that it cannot be sensed by any power except estimative. The eye of the deer, for example, can see the lion; the ear can hear its roar; the nose can pick up its scent. But there is nothing in the perceptions of these outer senses that gives a danger signal. That is the interpretation of another and higher sense: *estimative.* Again, neither imagination nor memory, as such, is concerned with making distinctions between what is good and bad for the organism—though memory can conserve the actual experience of situations where the welfare of the animal is at stake. Once a cat has been chased by a dog, it does not appear to forget it; and once a dog has been beaten by its master, it, too, remembers. On the grounds, therefore, that estimative sense recognizes elements in experience that no other sense can be aware of, St. Thomas raises it to the rank of a special power. More than this: because of the biological values with which it is concerned, he marks it immediately as the most important power in the animal's whole range of senses.

II. IN MAN

In man, estimative sense is so closely allied to mind that it takes on something of the latter's power of insight and judgment; and so St. Thomas calls it cogitative sense. Not that it is actually able to think or penetrate to the nature of its object! For, that would be making it equal to reason; and no sense faculty, however perfect, can

claim such a distinction. Still, it works in a way that is close to understanding. As a matter of fact, even in animals the quality of natural prudence which is associated with some of their instinctive actions is so startling as to be mistaken at times for intelligence. How much more warrant, then, for finding a kind of intellectual flavor in the achievements of man's estimative sense! To carry the comparison of Aquinas a little farther: the animal recognizes what is good or bad for itself by a natural instinct. Man, on the other hand, knows these same matters in a more perfect manner: by bringing his ideas to bear on the biological situation, and by making his power of estimation to act as though it were a thinking faculty. The task of mind, of course, is to apprehend the abstract relations that exist between things. Now, estimative sense cannot go this far; yet it is able to grasp concrete relations in a way that seems almost rational.

2. *The Notion of Instinct*

The modern notion of instinct is a rather complex affair that embraces three distinct features: first, a *knowledge* of the useful or harmful characteristics of an object; second, the experience of some sort of *emotion* as a result of this knowledge; third, *motor behavior*, whose particular pattern is fixed by the nature of the knowledge and emotions that give rise to it. The whole thing hangs together like the links of a chain; so that if we take away the first link, which is knowledge, the rest of the chain has nothing to depend upon. This means that unless we admit the essentially estimative basis of instinct, we have no way of understanding what it is or how it works. Hence when St. Thomas says that "instinct is the cause of all the animal's behavior," he is tracing its action to some sort of awareness of the biological value of stimuli. His teaching, on this point, is in general accord with William McDougall, who, more than any other modern, has fought to retain the notion of instinct in scientific psychology. Starting, then, with estimation as a basis, and following the outlines of McDougall's own account, we may define instinct as *an innate arrangement of animal powers which enables its possessor to recognize at once the usefulness and harmfulness of certain objects, to experience emotional excitement as a result of such knowledge, and to act or feel the urge to act in a particular*

manner according to the biological value of the objects thus perceived.

Most noteworthy about all instinctive movements, of course, is the fact that they are never matters of indifference to the animal, but rather things that deeply touch its life and survival. St. Thomas brings out this point when he says: "If the animal were moved only by what is pleasing or displeasing to the outer senses, there would be no need of attributing to it any power beyond that of perceiving what is immediately attractive or distasteful to these senses. But it has to seek or avoid certain things, not merely because they please or displease, but also because they are advantageous or harmful [to the organism]. Thus, the sheep does not flee from the wolf because of the latter's color or shape, but because it is a natural enemy. And the bird does not gather straws for its nest because they are particularly pleasant to the senses, but because they are useful for building its nest." Hence the strategic position of estimative power in the total structure of the instinct.

3. *The Psychosomatic Nature of Instinct*

Instinct is something common to animal and man. As a manifold of several powers, it covers the whole range of sensitive life—showing how knowledge, emotion, and outer behavior can be brought into harmony and balance and made to serve the interests of the entire organism. Each power, moreover, belongs to the composite, that is, to the body and soul united as one; so that instinct, as a whole, must also be psychosomatic in nature.

I. THE PSYCHIC ELEMENT

In the animal, the *knowledge* that is given with its estimative sense is often of a kind that man can acquire only by study and research. The beaver builds its dam as though it were well acquainted with the principles of hydraulics. A certain type of wasp paralyzes the insect on which it feeds with enough skill to show a good knowledge of anatomy. Another type kills a prey several times its size and weight, and then propels it along an open waterway to avoid the trouble of dragging it. A spider weaves its web on the model of a logarithmic spiral. And so with the countless other examples that might be given of the instinctive wisdom of the

animal kingdom—a wisdom that certainly is not gathered from experience, yet is unfailingly present when the animal has need of it.

The *emotional element* of instinct is nature's guarantee that the knowledge she gives will be turned into action. It would be of little avail to the lamb if its consciousness of danger at the approach of the wolf did not arouse a strong feeling of fear. So, too, in other situations, where the concern of the animal is to secure food, or a mate, or shelter and protection for the offspring it is rearing. Indeed, there is reason for saying that every instinctive movement has the force of some sort of emotion behind it. The bird may or may not like the muddy haunts where it collects the straws for its nest; but its natural fastidiousness is overweighed by the excitement of building a home and providing a place for its fledglings to come.

Motor behavior simply rounds out and completes the pattern of instinctive tendencies. By means of it, and the power of local motion that it employs, the animal is able to fulfill the basic purpose of its nature. This it does in a variety of ways, according to the structure of its motor apparatus: by running, crawling, swimming, flying, and all the other modes of behavior by which it gives outer expression to the insistence of its knowledge and the force of its feelings. And in each instance, we note with amazement, the pattern of its action is suited to some real need: either the critical demands of the present moment; or the urge to provide against the wants of the future.

II. THE SOMATIC ELEMENT

On its organic side, instinct is correlated at every stage of its growth and maturation with the nervous system. Both estimative power, which is the source of its knowledge, and sensitive appetite which gives rise to emotion, are dependent on the brain; while motor reaction, of the kind required for the working of the instinct, is always linked up with controls in the cortex. From the point of view of physiology, therefore, instinct is inconceivable without a cortical basis; just as, from the standpoint of psychology, it cannot be thought of without the element of consciousness. In fact, if we leave out these two all-important factors—cortex and consciousness—it is impossible to distinguish between instinct and reflex. As McDougall rightly holds, this is one of the failures of the behavioristic school whose followers see no reason for dragging in consciousness in order to account for the effects of instinctive tendencies.

4. *The Purposive Character of Instincts*

The problem of purpose in instincts is one of the most delicate issues in modern science. Most of the difficulties in the way to an acceptance of the idea are due to prejudice or misunderstanding; yet purposiveness is plain enough in the world around us. All it means, really, is that there are signs of intelligence in the workings of nature. Now, the instinctive behavior of animals gives every evidence of a mind at the back of it. In fact, it is one of the most unambiguous proofs of a design and a designer! This does not mean, to be sure, that the animal itself understands the goal of its actions, any more than the radio follows the drift of the speech it is recording. It does mean, however, that without intelligence, instinct is unintelligible. And so, as St. Thomas teaches, the final account of the matter can only be given when instinct is regarded as a gift of the Creator.

Aquinas does not treat the problem of the animal's instincts in detail; but he is at pains to point out that the most striking quality of instinctive behavior is the unawareness of purpose with which it is performed. Thus, "animals of the same species always act in the same way, being moved by nature, not by art, to the execution of their tasks. Hence every swallow builds its nest and every spider spins its web along identical lines." The fact that they give no thought to what they are doing is shown by this constant determination of their powers to one course of action—like the speeding of an arrow towards the heart of a target. The arrow is an indication of the existence of an archer; and its flight towards the target shows the influence of a guiding hand. But neither arrow nor animal knows the reason of its movements. As a matter of fact, there is no need of their knowing, since they are already well established in the direction of their goal; and there is only one route along which they can travel. The behavior of man, on the other hand, is quite a different affair; for, he is not only able to understand the nature of his goal, but can also choose the means that will lead him to it.

It remains true, however, as St. Thomas says, that the animal acts with the "prudence of nature" in its search for what is useful and its avoidance of what is harmful; and these "marks of sagacity," so manifest in its movements, are the clearest sort of testimony to both the subjective purposiveness of its instincts, and the objective presence of Intelligence.

5. *Kinds of Instincts*

The grouping of instincts is a more or less arbitrary matter; and no two authors are agreed as to how they should be classified. Perhaps the easiest and most natural way is with reference to the ends that they serve. As McDougall points out, the lower we go on the scale of instinctive behavior, the greater is the tendency of its emotional content to be diffuse and undefinable. Not that our feelings, in such cases, are not strong! On the contrary, the instincts associated with our purely vegetative needs seem to have the most powerful and urgent emotional tones of all. But their very diffusiveness is the reason we cannot specify them clearly—except to give them the name of the need itself.

Thus, at the bottom of the ladder of instinct, we find the master urges of hunger and sex. They are immediately concerned with body wants; and their purpose is very obvious, since without the inclinations that they bestow on our nature, both the individual and the species might be seriously endangered. This places them at the core, so to speak, of our physical existence; and that, perhaps, is why their emotional complexity is so hard to define. One might say that they have the same affective meaning for us as existence itself.

Then, as we go up on the rungs of the ladder, other urges appear, still having to do with survival and still uncoupled with well-defined emotions. Such are the drives that deal with the selection and preparation of food; the building of homes; the rearing of young; the devising of means of adequate protection; the adjustment of the organism to changes in surround; and, since we are disposed from birth to be sociable, the fitting of our natures for the give and take of life in community. It might make matters much more simple, to be sure, were we to say that this whole second group of tendencies are only refined manifestations, on a loftier cultural level, of the basic urges of hunger and sex.

Higher still on the ladder, we come to instincts with emotions that are clearly marked. Here it is not so much a problem of survival as of preparing the organism beforehand for the special situations it is likely to meet with in the course of life. We cannot list all the endowments with which nature has favored us in this way; but the major ones are mentioned by McDougall. Thus, there is the instinct of flight and the emotion of fear; the fighting instinct and

the emotion of anger; the instinct of avoidance and the feeling of disgust; the instinct of curiosity and the emotion of wonder; the instinct of self-abasement and the feeling of dejection; the instinct of self-assertion and the feeling of elation; the parental instinct and the feeling of tenderness.

Finally, at the top of the ladder we have those natural tendencies that seem to be more closely related to mind than to matter, since they can be satisfied in a variety of ways and on a wide range of objects. Thus, we are innately disposed to play and recreate; to imitate the people around us; to act on suggestion; and to sympathize with others. The child, for example, tends to mimic the walk, gestures, and facial expression of his elders and to copy their manner of speech; just as he can amuse himself with almost anything that is put in his hands. Suggestion and sympathy, too, have a share in his life, especially in the unfolding of his mind and will. But no one, of whatever age, is free of the influence of these natural tendencies; and their persistence throughout most of our lives is proof, as the poet once said, that men are but children of a larger growth.

6. *How Instincts Are Developed and Modified*

I. DEVELOPMENT

While it is true that some forms of instinctive behavior are present from the beginning, others have to wait on the growth of the body before they are able to put in an appearance. And even with the instincts that are manifest at birth, their smooth operation does not usually come until after a certain number of trial and error movements have been accomplished. One of the most interesting pieces of research from the laboratory is concerned with the pecking instinct of the chick. Before it is hatched, there are wagging motions of the head that seem to forecast its later pecking activities. During one of these agitations, that really involve the whole body, the shell cracks open and the chick is released. Its first efforts, of course, are spent in learning how to eat. At the start of the process, it often misses the food particle at which it is striking. Or, it may succeed in hitting its objective but fail to retain it. Only after several days is it able to peck accurately and eat with the adeptness of the adult. If some of the chicks of a batch are fed artificially and not allowed to peck during that time, they afterwards learn to peck with just

as much skill as the others that had begun operations earlier. From studies of this kind, it seems plain that both maturation and practise have a part to play in the complete functioning of instincts.

II. MODIFICATION

On its *cognitive* side, we may speak of a change in instinct. The awareness of an object that originally aroused fear, for example, may be altered to another form of knowledge, until finally the impulse to escape has disappeared altogether. This is what happens in the domestication of wild animals. And the process may be reversed, too; so that a percept or image which, in the first instance, provoked no apparent emotion, is eventually able to do so. Thus, birds on a desert island as a rule show no fear of man. But after his presence has been coupled with memories of injuries or attempts on their lives, the sight of man is enough to cause concealment or flight. With the human animal, too, the impact of ideas on instinctive knowledge may bring about some change in instinctive behavior. This is particularly the case with the hunger and sex urges. Again, instinctive presentiments of danger and death, which seem to be quite clear in the consciousness of some people, can be considerably modified by the strength of one's religious faith.

On its *affective* side, there is little change noticeable in the workings of instinct. Of course, where knowledge is altered, we can expect some difference in the emotion that it causes. But given the instinctive awareness of an object or situation, the pattern of feeling follows the pattern of knowledge. Moreover, in man's case, the matter of his emotional life is a moral, as well as a psychological, problem; and we shall have more to say about the right way of handling it in a later chapter. At this point it may be noted that while little can be accomplished about changing our emotions, a great deal can be done about the direction in which they will flow. Thus, it is possible that they should be shunted towards a goal which is quite different from the one that nature first intended.

Finally, on the *motor* side, the range of modification of instinct is perhaps greater than anywhere else; and instances might be cited from several quarters. We shall confine ourselves to two. The first is the case of the animal that is learning to adjust itself to a new situation. A rat, for example, is placed in a maze and allowed to make exploratory movements. Since it is naturally curious, its im-

Desiré Mercier. It occupies a position midway between the two classes of theories we have just described, holding that the principle of instinct is found at the sensitive level of life.

8. *Evaluation of Theories*

I. REFLEX CONTROL

The single fact that strikes hardest against all theories of reflex control is the presence of consciousness in the instinctive actions of the animal. For example, a caterpillar will stop to repair damages that are deliberately done to its work when it is in the process of weaving its cocoon. Bees, too, will adapt their constructive instinct when something happens to their hive that calls for mending, as Henri Fabre proves with first-hand evidence. Similarly a case is cited by Hans Driesch where a silkworm did not weave a web when it was cultivated in a box of tulle—an economic omission of the first step of its labors when a ready-made equivalent was furnished. Reflexes are present in instinctive responses, to be sure; but they can never be more than a partial factor. As Herbert Jennings observes, the state of the organism as a whole must be taken into account. And he points to the behavior of the earthworm which may turn to the right just because it has turned to the left, but may also execute two or three movements to the right before a change in the other direction puts in an appearance. Now, if awareness of a stimulus situation can be detected in organisms of a relatively low degree of knowledge, how much easier it is to see signs of conscious adjustment in animals that enjoy a wider range of activities! The lion, for example, in stalking its prey, accommodates itself continuously to changing and unforeseen circumstances; and when it has captured and devoured its victim, its attitude towards food is entirely different from that evinced before its hunger was satisfied. The same sort of estimative awareness of stimulus and adaptation to the complex elements of its surroundings is shown in the animal's mating instinct.

II. INTELLECTUAL CONTROL

Here we may be fighting a straw man when we argue against the presence of insight in the animal's behavior; because it is possible that what the moderns call "insight" and "intelligence" are not

intellectual factors at all! St. Thomas is quite clear on the matter. For him, insight is the ability to reach and penetrate reality, to lay bare its nature; while intelligence is the power of gathering generalized knowledge, or of looking at things in an abstract way. Now by this kind of criterion, there is no case on record where an animal solves its problems through insight or intelligence. Only man uses the tool of abstraction. Yet the notion persists, in the popular fancy as well as in scientific circles, that the animal is capable of a rude sort of thought. I shall cite three famous test cases that will shed light on the issues at stake.

The first is that of Wolfgang Köhler's ape, which was able to join together sticks and rake in a banana that lay outside its cage. To say the least, this was a most unusual synthesis of the items of its experience; yet I do not think that it calls for more than an awareness of the concrete relationship of one stick to another, and of the overall length of the sticks to the distance of the fruit from its cage. Let us suppose, now, that the sticks were replaced by a rope which the animal straightway employed to lasso the banana. One might then begin to suspect a movement of abstraction going on in its brain, as though it were reasoning: *what I want is something to lengthen my reach; but a rope satisfies this condition just as well as the sticks; therefore.* The account of the experiment, however, gives no hint that the ape ever used tools in a rational way, or that it settled its problem on a basis of insight.

The second is the case of Desiré Mercier's dog. It was accustomed to seeing its master sop up the water in his boat with a sponge which, at a sign, it would fetch from the house when the master forgot it. But one day the unremembered sponge was nowhere to be found; and the dog returned to the boat empty-mouthed and unsuccessful. Now, let us suppose that, failing to locate the sponge, it had brought back a cloth instead. Again, it would look like abstraction: *what my master needs is something to sop up water; but a cloth serves the purpose as well as a sponge; therefore.* Surely this is the way that the master himself would have reasoned.

The third is the case of St. Thomas's hound which I shall cite in his own words. "A hound is running on the scent of a stag when it comes to a crossroads. Having made trial of the first and second roads, and being assured by its sense of smell that the stag did not go either of these ways, it takes the third road without even testing

the scent; as though it were using the principle of exclusion and discoursing thus with itself: *the stag did not travel by the first or second road; therefore it must have gone by the third.*" The example is remarkable enough; yet, in the opinion of Aquinas, it needs only the concrete apprehensions of sense to account for it. It still remains true, however, that much of the knowledge which the animal possesses by instinct, can be arrived at, in man's case, only after a rational search.

III. SENSITIVE CONTROL

According to St. Thomas, the knowledge that comes from the senses, and the emotions that follow from awareness of the biological value of objects, are enough to explain the instinctive behavior of animals. It begins, let us say, with perception: a consciousness of color, or sound, or odor, on the outside; or of hunger, or thirst, or the stimulus of sex, on the inside. But always there is the further connotation of utility or harm about the objects perceived. At once, groups of images arise that picture the movements of approach or retreat necessary for the fulfillment of the instinctive tendency; and with the images comes the strong urge to act. The rest of the procedure simply completes the cycle which started with knowledge and now, under the impulse of feelings, is brought to completion. That the animal has even the faintest awareness of why it acts as it does is unlikely. St. Thomas is quite sure that it knows nothing about goals; and much less does it weigh and deliberate about ways to securing its ends. It simply follows in the groove that is laid down by nature; and I daresay if we could uncover the dynamics of its consciousness and look directly at the workings of instinct, we should find it is mainly a matter of imagining the acts that have to be here and now performed with a view to survival. This imaginal content, with estimative knowledge at its core, has a two-fold task to perform: first, to stir up emotion, so that the animal feels impelled to respond to the demands of the situation; secondly, to serve as a guide in the execution of the movements involved in instinctive behavior.

9. The Rôle of Instinct in the Life of Man

The most important single feature of our human instincts, I should say, is their *plasticity*. They can be shaped in a variety of ways; and the final form that they take depends, in part, on the kind of object

that is allowed to arouse them; in part, on the influence of mind and will as they unfold and grow to maturity. Thus, it is obvious that a man can select the sort of food he will eat, or the wife he will marry, or the house he will live in. And having fixed on his choice, he can further devise rules for himself as to when and how he shall manifest his instincts. At a relatively early period in his life, reason puts in its appearance; and with reason comes a consciousness of the moral meaning of his impulses. From this time on, instincts begin to undergo change; so that they can never thereafter be as simple and unreflective in their goal-seeking as they were in his childhood. They may be used or abused, as a person decides; but the fact that they can be managed by will and made to conform to the rules of right reason is proof of man's pre-eminence in the animal kingdom.

10. Cogitative Power and the Life of Mind

Before closing this chapter, a word must be added about cogitative sense and the special meaning that it has for the functions of mind. In the psychology of Aquinas, it is basically concerned with what is useful and harmful to the organism; so that it is the same as the animal's estimative power. In its human setting, however, it is placed next to mind and is naturally influenced by this close association. Its task is to "collate"; that is, to gather and compare the various items of experience that are brought into consciousness by the other senses. Its movements are so suggestive of the way reason links premise with premise before drawing a conclusion, that Aquinas describes them as a kind of discourse. All senses are its creditors, since it borrows from all in the formation of its images. And because these latter represent a synthesis of experiences associated with our deepest biological needs, St. Thomas regards them as the highest and most perfectly organized data of sense that mind has to work with. Indeed, if the products of imagination and memory are *germs* of ideas, as we called them on a previous page, those of cogitative sense are the closest to *fruition* and best prepared to supply food for the abstractive functions of intellect.

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Chapter 18
EMOTION AND OUTER BEHAVIOR

Part I: THE SENSITIVE APPETITES

1. The Meaning of Appetition

Our studies up to this point have stressed only the cognitive side of our nature, as animals. The products of the outer and inner senses are the outcome of processes that begin with the action of an object and end with knowledge of some sort. Whether it be the formation of a percept or an image, the term of activity in each case is the conscious possession of a fact or body of facts about the cosmos. But there is another group of functions, also sensitive in nature, whose term is at opposite poles to that of knowledge. This new kind of psychological datum is known as *appetition;* or more commonly among the moderns, as *orexis.* Both words have the same meaning at bottom: that of stretching out towards something in a movement of desire. Thus, if the goal of knowledge is possession of the object in consciousness, that of appetition is laying hold of the object in itself. As St. Thomas says: "The work of a cognitive power is completed when the thing known is united with the knower. That of an appetitive power, on the other hand, is brought to a close only when the one who desires is borne by an impulsion towards the thing desired."

Moreover, since desire is always begotten of knowledge, we should expect to find a kind of appetition that accords with the knowledge of the senses; and such is the case, exactly. It is known as sensitive appetition; and it springs from powers that we have in common with the animal. Because it is a function of brute nature, it must be carefully distinguished from appetition of the will which is wholly immaterial, as we shall see in a later chapter. The fact that it is sensitive at once implies that it proceeds from soul and body to-

gether; or more particularly, from powers that are partly psychic and partly somatic.

2. *The Kinds of Sensitive Appetite*

As St. Thomas observes, even in creatures that are lacking in knowledge, we can find a two-fold tendency at the base of their natures: the first, to seek out what they need for existence; the second, to resist the forces of corruption. So in ourselves and the brutes, where desires are conditioned by knowledge, we see the same inclinations, first, to possess the things that are suitable to our nature as animals; secondly, to struggle, if need be, in order to get what we want. Hence the two kinds of appetites that we share with the brute: one, *concupiscible,* so named because it deals with goods that are simply objects of sensible pleasure; the other, *irascible,* whose task is to urge us to fight for the goods that are encumbered with difficulties. And since life is a constant battle, especially at the sensitive level, it follows "that the animal must first make sure of victory, through the movements of irascible appetite, before it can perfectly enjoy the goods of concupiscible appetite. These latter, of course, are chiefly matters of food and sex; and they are the things that provoke most of the fighting." It must not be thought, however, that our appetitive powers are concerned only with goods. True, this is their main objective, always; but, just as there are things that naturally attract them, so there are other things that naturally repel them. In fine, *goods* find their counterpart in *evils;* and both have a meaning for our sensitive appetites, as will appear later on.

3. *The Acts of Sensitive Appetite*

In the psychology of St. Thomas, the act of a sensitive appetite is known as a *passion.* The word is a good one, but much neglected by the moderns. In its Latin root meaning, it implies a sufferance of some sort; and surely we must admit that the experience of a passion somehow alters us. But this is quite natural, since passion is never present without bodily change; and it is possible to us only because we have matter in our make-up. Moreover, although it is different from any process of cognition, yet its life and being are dependent on knowledge. Such, in any case, is the way Aquinas looks at it; and we can sum up the main elements of his teaching

by defining passion as *the movement of a sensitive appetite, resulting from knowledge, and marked by changes in the regulated functions of the body.*

But the moderns, as we remarked a moment ago, have little use for the word "passion," except, perhaps, to signify movements of love or anger. Curiously enough, these are the typical acts of our concupiscible and irascible appetites; yet they by no means exhaust the range of response of which our appetitive powers are capable. To return to our point: in psychology today, "feeling" and "emotion" are the words generally used to describe the movements of the sensitive appetites. There is no objection at all to this terminology, provided we do not lose sight of the fact that both words are embraced in the general idea of "passion," as St. Thomas explains it. The advantage of separating feeling from emotion is obvious if, by the former, we mean movements of the appetite with bodily changes that are relatively weak; and by the latter, the same kind of movements but with modifications that are relatively strong. Aquinas himself, I am certain, would agree on the soundness of such a distinction.

I. FEELING

Feeling is one of the most common events in our lives, yet almost impossible to describe in terms of its qualities. Why this should be so is not hard to see, since feeling really is not a matter of knowing, but of being moved towards or away from an object that stirs up the appetite. Then there is the further fact that as soon as we begin to consciously analyze it, it seems to dry up and disappear. To be sure, the world of cognition and that of appetition are not unconnected; still one cannot be explained in terms of the other, any more than the emotional effect of a symphony can be accounted for by reading the notes that compose it. Feeling, as St. Thomas recognizes, is present in all our conscious acts. When they are full and well-rounded, it is pleasant and stimulating. When they are impeded or cut short, it is unpleasant and depressing. This is true, moreover, of the acts of our intellect, as well as those of our senses; for, the rule is the same in all cases: that "action gives pleasure, so far forth as it is perfect." And in saying this much about the qualities of feeling, Aquinas has gone as far as the most advanced of the moderns.

One point, however, he would be careful to repeat: that feeling is not knowledge or any aspect of knowledge. As a psychological fact, it is an irreducible datum. It stands apart, in a class by itself. Where the difficulty arises is in the matter of sensation; and more particularly, in those basic types of experience that we call organic sensations. Here our language may be at fault, since "to feel" and "to sense" are often used interchangeably. Yet, they are distinct psychological events, the one being appetitive, the other cognitive in nature. It is true that in both scientific and popular speech, we talk of feelings of hunger, thirst, sex, and so forth. What we mean, of course, is that we are aware of certain physiological states of the body; and that this knowledge is accompanied by an orectic experience which is either pleasant or unpleasant. Now, the awareness is a sensation, and a function of sense, therefore; whereas the orectic experience is a feeling, and the product of an appetite. They go together, but are not for that reason identifiable. Joseph Fröbes made a thorough experimental survey of the three possible theories on this point: that feeling is the same as sensation; that feeling is an attribute of sensation; and that feeling is a special and primary datum of experience that cannot be brought under any other category. And having weighed all the findings, he concludes that the third position, which is the one St. Thomas holds, has the soundest basis.

The importance of feeling, for both body and mind, cannot be overestimated. The first item of experience in the newborn child is his own physical organism and the powers that are concerned with the sustaining of life. Pleasant feelings are like fingerposts, pointing to conditions that are biologically favorable. Unpleasant feelings, on the other hand, are signals of distress, of overtaxed energies, or even of injury. So fundamental is the meaning of these first appetitive processes that it is unlikely life could go on without them; and some psychologists are inclined to regard them as even more basic than our primary sensations. To be sure, this is suspiciously like getting the cart before the horse, since feeling is an effect of knowing and cannot exist without a root in sensation. Still, it is true that our feelings have a tremendous survival-value; and looked at in this light, they are certainly just as important as our primitive sensations. St. Thomas would share this view to the extent of saying that the healthy and normal exercise of every growing power re-

B. *Formal cause.* Once knowledge has made clear the good or bad aspects of an object, appetite is disposed to move. The direction of movement depends on how we look at the object. If it is perceived to be good, the impulse of appetite is to possess it, by a positive movement. If, on the contrary, it is seen to be bad, the tendency of appetite is to shy away, by a negative movement. But in either case, the essential core of the emotion is in this birth of an impulsion towards or away from its object. And as with feeling, so with emotion, the movement always has a quality of pleasantness or unpleasantness that gives added force to the urgency of appetite.

C. *Material cause.* For St. Thomas, body changes also belong to the essence of an emotion. These include both the discharge of nerve energies, and various "resonances" of the physiological system. Modern research has given us a clear picture of how profoundly such changes affect us. They are manifest, for example, in the speeding up of heartbeat; quickened respiration; increase of glandular secretions; paralysis of muscles; slowing down of peristalsis; nervousness; indigestion; sweating, and so forth—according to the nature of the emotion. The point to remember is that they are part and parcel of every movement of appetite. They may be present without emotion, as Aquinas would allow; but given an emotion, they are never absent.

D. *Final cause.* What we have said about the biological value of our feelings is also true of our emotions. They form a natural bridge between knowledge and action; and their occurrence in instinctive behavior is the best clue to their importance for life at a sensitive level. As products of powers that belong to body and soul together, they put us in immediate communion with our cosmic surrounding; and their goal, in the deep plan of nature, is to promote and preserve our physical well-being. Moreover, as sources of external action, and as movements that can be guided by the rules of right reason, they have a task to perform in the building of character.

4. *St. Thomas's List of Emotions*

In spite of repeated efforts, no notable improvements have been made on St. Thomas's grouping of the human emotions. It is based on two simple principles: first, the nature of the stimulus which sets off the appetite; then, the way in which the appetite reacts to stimu-

Emotions (passions)	mild (concupiscible)	favorable stimulus (good)	I. *love:*	pleasure in object as good
			II. *desire:*	affective approach to good
			III. *joy:*	affective possession of good
		unfavorable stimulus (evil)	IV. *hatred:*	displeasure in object as evil
			V. *aversion:*	affective retreat from evil
			VI. *sorrow:*	affective possession of evil
	emergency (irascible)	favorable but hard to attain (difficult good)	VII. *hope:*	affective approach to difficult good as attainable
			VIII. *despair:*	affective approach to difficult good as unattainable
		unfavorable and hard to avoid (difficult evil)	IX. *courage:*	affective retreat from difficult evil as escapable
			X. *fear:*	affective retreat from difficult evil as inescapable
			XI. *anger:*	affective possession of difficult evil

lation. But it also has a solid foundation in experience or empirical observation; and the evidence that comes from our laboratories today only serves to confirm its general outlines. It calls for the distinction, already noted on a previous page, of the two kinds of appetitive power.

The first is concupiscible, which gives rise to what is known among the moderns as the "mild" type of emotion. It is motivated by knowledge of an object simply as good or evil; and according to its inclination to approach or retreat, it produces movements of *love* or *hatred; desire* or *aversion; joy* or *sorrow.*

The second is irascible, from which we get the "emergency" type of emotion, as it is called today. Now the motive is enlarged by the knowledge of certain difficulties attaching to the object; and again in line with the tendency of appetite to approach what is good and avoid what is evil, such knowledge causes movements of *hope* or *despair,* when the stimulus is favorable; *courage* or *fear* or *anger* when the stimulus is unfavorable.

The diagram on page 233 is a summary of the main features of the St. Thomas's classification.

5. *Experimental Studies*

Gregory Schramm has isolated several factors from the classification of St. Thomas and shown how they have been confirmed by the findings of science.

I. FAVORABLE AND UNFAVORABLE STIMULUS

The biologist, Herbert Jennings, made a special study of the reactions of *Euglena viridis* towards an optimum of light. This tiny animal organism is found in water that contains dead organic matter. It is shaped like a pear and has a gullet, tail, and eyespot. It does not actually see things; yet the eyespot is known to be more sensitive to light than the rest of the body. Now as Jennings observed, when light of a certain intensity was played on *Euglena,* it began to set up avoidance reactions. These movements continued, with trial experience of different positions of its body, until finally an optimum arrangement was hit on, where the strength of the light was apparently most favorable. Results of a similar nature were noted by Charlotte Bühler, in her interesting researches on very young children. Thus favorable conditions in nursing, such as

warmth, dryness, regular feeding, and gentle movements, brought forth positive responses; while unfavorable conditions, like cold, wetness, hunger, thirst, and strong sensory stimuli of any sort, produced patterns of behavior that were decidedly negative.

II. THE PRESENCE AND ABSENCE OF STIMULUS

Walter Hunter made some measurements of the delayed reaction of animals to discontinued stimuli, by reckoning the amount of time it took to get properly orientated towards food after a light had been flashed. He found that the periods of delay vary considerably: ten seconds for white rats; twenty-five seconds for raccoons; and five minutes for dogs. Hildegard Hetzer arranged a series of analogous experiments on infants in an effort to determine their expectation of stimuli about to appear. A child was set before a screen with a hole in it in which a tiny bell was hung. The bell was rung for ten seconds and then removed for ten seconds. The procedure was repeated six times. If, in the course of the demonstration, the bell was not displayed after the usual ten second interval, the child began searching for it by movements of the eyes and head, and on failing to find it, gave vocal signs of impatience.

III. THE DIFFICULTY FACTOR

The difficulty factor has been confirmed by two pieces of evidence from the laboratory. The first was a study of rats, made by Fred Moss. Various kinds of obstructions were placed in the way to their free movement, thus making it hard for them to reach a food stimulus. Using an electrified grill, Moss observed that failures to attain their goal were in direct proportion to the impediments they had to overcome. He concluded that the behavior of animals, in general, is the outcome of an affective urge to act, on one side, and of actual resistance to obstacles, on the other; so that the strength of their emotional drives can be measured in terms of the difficulties they have to struggle against.

The correlated problem of absence of the difficulty factor, involving a minimum of effort on the part of the animal, was studied by Loh Seng Ts'ai. The function of the experiment was to set up conditions that made for ease of access to the stimulus. This was achieved by placing the rats before a number of doors, behind which lay a quantity of food. Each door was secured with weights of vary-

ing resistance mass; and it was noted that, after a few trials, the rats regularly used the doors that demanded the smallest amount of effort to push open.

IV. APPROACH AND RETREAT

Again we have two sets of experimental findings. By using an obstruction apparatus, Frances Holden studied the crossing, contact, and jumping reactions of rats to an electrified grill. A crossing was registered when the animals actually traversed the grill, approached, and took hold of the food that was laid out as a bait. A contact was recorded when the rats merely touched the grill and withdrew, after receiving their first shock; or when they went part way across in the direction of the food and then retired because of the pressure of the current. A jump was indicated by an attempt to escape the entire stimulus situation. The crossing type of behavior is positive; contacting is positive followed by a negative response; jumping is entirely negative.

Findings of the same general nature were brought to light by Leslie Marston in a study of the reactions of children at play. Thus, on the entrance of an adult stranger, some were found to approach the newcomer without any special encouragement; others waited for a smile; others needed an express invitation; others had to have some additional assurance and urging, such as the offer of a toy or a sweet; others declined every offer and refused to approach at all.

V. MILD AND EMERGENCY FACTORS

Situations that are calculated to produce the mild type of emotion were studied by Charles Kimmins in his analysis of the child's day-dreams. He found that such fantasies, filled with desires or aversion that were worked out in imagination, covered a wide range of concerns about food, houses to live in, other children to associate with, future romantic interests, and so forth. Closely allied to fanciful states of this sort are the various forms of make-believe in which a child indulges when at play: the boy with his tin soldiers; the girl with her dolls and tea set.

John Watson experimented with several emergency situations where the body movements of the small infant were seriously hampered. Here the reaction was always clear and unambiguous. For example, hindering the free activity of head by pressing on its sides

with cotton wool resulted in a marked tension or stiffening of the limbs, slashing motions of the arms and legs, and vehement outcries. This kind of response continued to manifest itself as long as the exacerbating factor was left unremoved.

6. Theories of Emotion

Perhaps no single problem in modern psychology has provoked more theorizing than that of emotion. It is always a topic of great human interest; yet with all our research and practical experience of it, we know little about its secret wellsprings. The accounts given below represent some of the more widely discussed attempts to explain it.

I. THE DARWINIAN THEORY

The evolutionary theory of Charles Darwin is one of the first scientific efforts to get to the bottom of the meaning of emotion. In line with his general teaching, it tends to stress the value of affective behavior in the struggle for existence and the ultimate survival of the animal. While it is not really experimental, in the sense of being based on conditions of control, it still shows a keen observation of the reactions of both man and beast under emotional excitement. Thus, according to Darwin, emotions are serviceable habits, particularly in situations of attack and defense. A fair sample of this sort of response is found in the clenching of the fists when fighting is called for, or the baring of the teeth under the impulse of rage. Further, emotional behavior has a way of manifesting itself in opponent activities of the sort commonly seen in the spitting and purring of a cat. Finally, emotions are an outlet for bodies overcharged with nervous energy and which find relief in such typical reactions as trembling, weeping, sweating, involuntary urination, and so on.

II. THE JAMES-LANGE THEORY

The William James-Carl Lange theory is founded on both introspection and physiological analysis of emotion. It can be best described by giving an example of an affective experience, as James would portray it. We see an object, say a vicious dog, and hear it snarl. Now, from the point of view of knowledge, the dog is the cause of a series of visual and auditory percepts. But the procedure

does not end here. As a result of our apprehensions, a number of motor impulses are at once transferred to the muscles, glands, and viscera, setting them in movement. These disturbances are in turn relayed back to the brain, whereupon the object-simply-apprehended is transformed into an object-emotionally-felt. And so it is the feeling (sometimes called sensation) of bodily changes that really makes up the inner core of the emotion. The course of the process, therefore, is *A,* perception; *B,* physiological disturbance; *C,* feeling of physiological disturbance.

III. THE THALAMIC THEORY

Before entering on a discussion of the theory which Walter Cannon introduced into scientific circles, a word must be said about the location of the thalamus. Underneath the surface layers of the cortex, the brain is made up largely of a white pulp-like substance. Near its base, however, we find certain areas of grey matter; and two of these, one on either side of the brain's midline, are known as the oval masses. They form the thalamus. Now, in his experiments on lower animals, Cannon found that removal of the brain matter anterior to the thalamus did not eliminate the usual signs of rage, but that cutting off the thalamic area caused all such responses to disappear. He assumed, therefore, that the region of the thalamus is the co-ordinating center of emotional behavior. Further evidence of the truth of this assumption is supplied by the fact that a tumor on one side of the thalamus results in unilateral laughter or grimace.

In contrast to the sequence of events in the James-Lange theory, Cannon's account of the process is *A,* perception; *B,* affective experience; *C,* physiological change—with the reservation that physiological changes and the outer signs of emotion may be present without true emotional experience. It should be noted, too, that since the resonances of fear were found by Cannon to be identical with those of anger, it was impossible for him to distinguish between the two emotions on a basis of their organic qualities. As a matter of fact, I should say it is unlikely that any emotion can be specified by the kind of physiological disturbance it brings in its wake.

Cannon's theory, of course, is built mainly on a study of the emergency type of emotion, where quick mobilization of forces and vigorous muscular effort are called for, in order to deal with the gravity of the situation. Most important of the internal changes,

from the biological standpoint, are acceleration of heart beat, shifting of the blood from the abdominal organs to the active muscles, pouring of adrenin into the blood stream, and liberation of sugar from the liver. These are the typical body changes of fear and anger; and like all the natural defense mechanisms of the organism, they are brought into play by the autonomic nervous system.

IV. OTHER THEORIES

Other accounts have been made of emotion, but none have received the notice from scientific investigators that has been accorded the theories of James-Lange and Cannon. McDougall explains the emotional experience as one of the elements of instinct; and this, I think, is very true and a point well worth recording. It means, in effect, that every emotion is a manifestation of instinctive behavior; and it is a confirmation of St. Thomas's teaching that movements of the sensitive appetites are always motivated by knowledge arising immediately from estimative or cogitative sense.

For Watson and the behaviorists generally, emotions are partly inherited and partly learned modes of response. Thus fear, anger, and love, so they say, can be aroused without benefit of previous knowledge. In fact, no affective state is dependent on consciousness, as such. Or to put it the other way about, consciousness has nothing to do with emotion since the latter is a type of body reaction, pure and simple. It is distinguished from other kinds of organic response by its visceral origin. Needless to say, it is mainly a matter of reflexes.

The views of Freud and his followers represent a clinical approach to the problem of emotion. Thus, all affective states are associated in one way or another with sense-love or *libido* which is the primeval urge to conserve and propagate the life of the body. From this basic animal force in our nature, as from a fountain head, all other emotions are derived, whether they be connected with feeding and reproducing the organism; or with more communal interests, such as the cherishing of family, friends, and country. Now, while St. Thomas insists that there is also a higher love of the will which has a rôle to play in our lives on earth, he would agree with Freud on the primacy of sense-love as far as the rest of our emotions are concerned. In fact, when we come down to it, the passion of love is the beginning and end, the alpha and omega,

of all other passions. Without it, our hatreds and repulsions, joys and sorrows, hopes and despairs, fears and angers simply have no meaning or real reason of being.

V. A FINAL WORD ON THEORIES

We have already indicated the basic lines along which St. Thomas interprets the emotional process. As a preliminary stage to orexis, it is necessary to suppose some form of *knowledge*, or the establishment of an object, as desirable or undesirable, within the field of consciousness. For, knowledge alone can set the powers of orexis in motion. The result is *appetition;* that is, the inclining of sensitive appetite towards its object as the term of its orectic tendencies. Here it should be pointed out that the fundamental urge of an appetite is always towards good; so that even when it has to deal with an evil, it is still seeking the good of the organism. Hence its conservative movements of withdrawal, when faced with an unfavorable stimulus. Finally, going along with the appetitive process are the *physiological changes* with which we are familiar, and which are comparable to the rest of the emotion as material cause to formal cause.

Now, turning once more to the modern accounts: we find that the views of Aquinas are in agreement with the James-Lange theory in stressing the meaningful situation as the point of departure of the affective experience, but at loggerheads with the position of Watson who discards consciousness as a causal factor in the appearance of an emotion. Further, St. Thomas's inclusion of knowledge, appetition, and physiological resonance in the total account of the process is in general accord with the drift of experimental work today, and especially with the findings of Cannon. But the last-named factor—physiological resonance—is not merely a consequent of affective experience in the theory of the Angelic Doctor. Rather, it belongs to the very essence of emotion. To repeat: it is impossible for Aquinas to conceive of emotion without organic disturbance of some sort; even though, as Cannon has shown, emotional behavior does occur at times in the absence of true emotional experience. This would settle the issue, in the mind of St. Thomas at any rate, as to where the physiological factor should be interpolated. For him it is not a question of feeling or emotion either preceding or following body changes in a temporal order; but of two partial factors, the

ity, in which art, music, poetry, and religion all can share with great profit. The goal, then, is not to repress, but to purify; not to root out, but to sublimate: by consciously directing our appetites to ends that accord with our nature as rational beings. Only man, to be sure, of all the denizens of the animal kingdom, is able to devise idealistic ways for the expression of his emotions. Only because his instincts can be shaped to higher purposes by the action of reason and will, is he able to express anger in righteous indignation; fear in works of mercy; love in social service; and courage in martyrdom!

Part II: THE POWER OF LOCAL MOVEMENT

1. The Meaning of Outer Behavior

In the psychology of Aquinas, outer behavior is the product of the power of local motion. It is the last of the faculties that we share with the animal: and the brief account we give of it here completes the picture of the sensitive part of our nature.

Although reflexes are a species of local movement, they do not depend on consciousness. It is rather through muscles whose movements are controlled by the central nervous system that we give outward expression to the knowledge of the senses and the impulsions of the lower appetites. But here again we have an advantage over the animal since we can also put the imprint of our ideas and volitions on matter. In short, our behavior can be intelligent as well as instinctive in origin: manifesting the concepts of mind as well as the percepts of sense. Moreover, since will is a free agent, it is able to use locomotive power in a way that is impossible to sensitive appetite which, as Aquinas says, is always "determined to one" in its manner of acting.

2. The Behavior of Animals

St. Thomas has given us many examples of animal behavior. There is the case of the lamb and the wolf, cited on a previous page. It brings out all the elements involved in a typical instinctive response. Thus the knowledge of danger, which comes from estimative power, causes an emotion of fear. The movement of sensitive appetite, in turn, leads to flight. The pattern of behavior is very clear: recognition of an unfavorable stimulus; the impulse to withdraw;

and exercise of the power of locomotion, enabling the lamb to flee from the wolf. In explaining outer behavior as a phenomenon of animal life, Aquinas refers to the rôle of knowledge as *directive;* that of emotion, as *imperative;* that of muscular movement, as *executive.* Once more the importance of the sensitive appetites for outer behavior becomes apparent: in the animal, they leave no choice, but only a blind obedience to the urgency of their demands. Indeed, it is safe to say that, apart from the training it may receive from man, everything the brute does is under the impulse of feeling and emotion.

3. *The Behavior of Man*

Man, too, acts under the impulse of his sensitive appetites; but he is also moved by will, enlightened by the insights of reason. And so his power of locomotion can serve as a basis for skills and craftsmanship that are wholly beyond the achievements of animals. Hand, foot, and tongue, in particular, have a flexible quality that make them ready tools of his thinking and willing.

The human hand is a masterpiece of suppleness and pliability. With it man manipulates matter and molds it according to the designs of his mind. It can move in all directions, bend and twist and shape itself to the form of any object that comes within reach of its grasp. It can wield a pen, a scalpel, or a sword, with equal grace and ease. Itself a tool, it can manufacture other implements that will either serve humanity or contribute to its undoing. As Aristotle says: "It is the organ of organs." Its fingers may be raised in a blessing; or extended to bestow a caress; or doubled into a fist that can strike with angry violence. In a sense, it is just as much a symbol of man's culture as his head or his heart, since it would avail him little if he did not have a hand to give external expression to what he conceives and wills.

The human foot, too, is the servant of man's thoughts and wishes. It is elastic, strong, and capable of adjusting itself to the surfaces on which it treads: to rough pathways through virgin forests or across mountain trails; to smooth pavements and the swaying tenuousness of a tight rope; to ice fields and ballrooms. With it he can walk, run, climb, and so wander as he pleases over the face of the earth in search of new things on which to exercise his powers of observation.

Finally, and most facile of all, man has a tongue that enables him

to talk. Nothing in the order of purely material events is more closely allied to mind than the fashioning of words, since these are the sensible signs of thought. And nothing, in the list of man's achievements, more clearly separates him from the rest of creation than his ability to invent and make use of language. By means of it, he can communicate his ideas and externalize his most secret longings. Without it, on the contrary, it would be hard to see how the story of his mental and moral advances could ever have been adequately told. Yet, the movements of his tongue, like those of his other body members, are no more than manifestations of his power of locomotion, expressing itself, when he wills, in intelligent behavior.

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SECTION 2. THE PHILOSOPHY OF SENSITIVE LIFE

Chapter 19

THE NATURE OF SENSITIVE LIFE

1. The Distinction of Plant and Animal

St. Thomas tells us that "animal" comes from *anima:* the Latin word for "soul." This does not mean that the plant is not possessed of a principle of life; but it does imply, by comparison, that the animal has a fuller share in the round of vital functions—that the orbit of its movements is much wider than the plant's. It can know, desire, and move about locally, at the same time as it eats, grows, and reproduces. Now, in the teaching of the Angelic Doctor, this is tantamount to a new degree of perfection in the ascending scale of life. And if we allow the evidence to speak for itself, no other point of view is possible to the philosopher. The widening out of horizons that comes from perceptual experience; the ability to picture things imaginatively and to recall what has happened before; the myriad forms of adaptation manifest in instinctive response, are all so many expansions of vital energizing that call for a new kind of life principle, since the plant is capable of none of them. It is not without reason, therefore, that Aquinas concludes to an essential distinction between the vegetative and sensitive grades of life.

At the same time, however, he is careful to insist that the movements of both plant and animal are *living* for exactly the same reasons: first, because they are spontaneous; and secondly, because they are immanent. And since the second of these two qualities is never present without the first, it is enough to name *immanence* as the philosopher's criterion of life. Further, if an animal is more perfect than a plant, it must be because the immanence of a sensitive act is more perfect than that of a vegetative act. This can be con-

firmed by a comparison of two typical processes: the assimilation of food by the plant; and the assimilation of knowledge by the animal. In the former case, matter is taken in and form left behind; in the latter, form is taken in and matter left behind. Now, it is an act of greater excellence to be united with a thing by its form than by its matter. Moreover, in the movement of knowledge, "the farther along the process goes, the more deeply does it penetrate [and the more perfect is the information]. Thus, the sensible object first impresses its form on the exterior senses, whence it proceeds on to imagination, coming to a halt only when it had made entry into the storehouse of memory."

2. *The Principle of Sensitive Life*

The theory of a vital principle has already been discussed at some length in a previous chapter of our book. There it was shown that the existence of a soul, to account for the phenomena of vegetative life, is a lawful conclusion from both the findings of science and the common observations of philosophy. To the processes of plant life, we now have to add those that are proper to the animal —making it necessary, *a fortiori*, to suppose the presence of a vital agency which is not only a principle of life, but a source of knowledge, emotion, and external movement as well. Let us see what Aquinas has to say about the nature of these sensitive acts.

I. KNOWLEDGE

Even after long introspection, it is hard to analyze our knowledge in terms more simple than the cognitive event itself. Essentially, it consists in a process of uniting object with subject by means of an intentional form. Its beginning is in the outer senses, since they are in immediate contact with the material aspects of the cosmos. A stimulus impinges on an organ, and some kind of reaction is set up. The result is a modification of the exterior sense. The change, according to St. Thomas, is neither wholly material nor wholly immaterial, since it is more than a purely physical phenomenon, yet less than a purely psychic one. Therefore, we have called it "psychophysical." But howsoever we name it, the effect of the action of the stimulus is vital; and the change thus wrought in sense is the objective determinant of knowledge. In his own tongue, Aquinas calls it a *species sensibilis* which, for technical

reasons, is best rendered in English simply as "sensible species." It is the medium between impression and expression; and its function is to specify the power that it informs. Thus, the throwing of the object against sense *(objicere)* is like the casting of a seed within the fertile depths of the power which becomes intentionally one with the object. With the birth of an impressed sensible species in common sense we have perception. With its further action on the representative senses, we have the formation of images which are expressed sensible species. The product in every case—percept or image—is not what we sense, but the living psychological medium by which we sense. This is very important to note, since only on condition *that we know things first in themselves,* are we able to say that our knowledge of reality is truly objective. Finally, sense and its object, performing their respective tasks together, actually make up a single principle of operation in the acquiring of knowledge, as Aquinas profoundly observes.

II. APPETITION

Appetition is a new kind of psychological event, because it means the tending of appetitive power in an outward direction. It is the effect of knowledge, with which it is contrasted by an opponency of goals. Perhaps the easiest way of expressing the difference is by saying that in the process of knowledge, the object moves towards the subject; whereas in the process of appetition the subject moves towards the object. Or even more simply: the goal of knowledge is union of object with subject; that of appetition, the union of subject with object. Moreover, just as in the movements of sense, there is no expression without impression, so in the movements of appetite, there is no feeling or emotion without knowledge. This need of a species to determine the cognitive power, and of a motive to arouse the appetites, is in the very nature of things. It also holds true on the intellectual level, as we shall see in a later chapter. Finally, the occurrence of feeling in all phases of human activity is recognized clearly by Aquinas. Thus, "there is pleasure not only in the experiences of touch and taste, but also in the operations of the other senses; and not only in sensitive functions, but in the speculations of mind as well. We feel happy, for example, when our search for truth finally ends in certitude. This is the rule for all our cognitive powers: that those acts yield most

pleasure which are flawlessly executed . . . and so we conclude that every operation is delightful to the extent that it is perfect."

III. OUTER BEHAVIOR

Man has matter in his nature and must move about in a world subject to the laws of space and time. Like the animal, he tends to project the knowledge of his senses and the desires of his appetites into concrete molds of behavior. But his outer movements can have a deeper and more sacramental meaning when they express his spiritual knowledge and love. Whereas in the brute, then, the only principle of control for its locomotive power is the law of sense appetition which is the law of feeling and emotion, in man the exterior movements of his body can result from a plan of reason and a command of will. Still, man is also an animal by nature; and the basic pattern of his motor behavior is not essentially different from that of the brute. We have already indicated how Aquinas analyzes it; but what we said may be repeated and summarized in his own words: "The motive of animal behavior is something which, when perceived, causes movement. Now the rôle of the motive can be looked at in different ways. From one point of view its task is to guide; from another, to command; from another, to carry out what is commanded. Thus guidance comes from the imaginal and estimative powers. . . . Command, on the other hand, is a function of the concupiscible and irascible appetites. . . . while the actual execution of what is commanded belongs to the locomotive faculty which works through the muscles, tendons, and nerves of the body."

3. *The Psychosomatic Composition of the Animal*

Our studies of the phenomena of sensitive life have shown one striking point on which St. Thomas and the moderns are in perfect agreement. It is the fact that for every conscious process there is a corresponding physiological function. Even the higher activities of mind, as he allows, demand an organic substratum, since they presuppose the integrity of both sense organs and their cortical connections. Here it suffices to note that if the conscious manifestations of the animal's powers may be taken as a clue to its nature, then the subject of such acts must be a composition of body and soul. Further, as with the plant, so with the animal: the body element

which is matter, and the soul element which is form, are incomplete from the standpoint of substance; so that one must be joined to the other before the organism can be said to exist. Moreover, the relation of contrast between the body and soul of the animal is the same as that which obtains between primary matter and substantial form in non-living corporeal creatures.

The presence of these two basic elements in the animal's nature is revealed to St. Thomas in a variety of ways, but especially in those acts where consciousness is involved. Thus nothing, from the analytic point of view, is more simple than sensation; yet sensation would be impossible without a body and a soul. On the one hand, it calls for the action of a stimulus on an end-organ, and the arousal of nerve currents that are passed on to the brain. On the other hand, it is completed only when the animal becomes aware of the thing that is impinging on sense. Now, the first part of the process is proper to the body, since it implies the interaction of material forces. But the second part is a new and altogether different kind of phenomenon which can be properly accounted for only by reference to the soul, since only the soul is a principle of consciousness. From evidence of this sort (and it is even plainer to see in the case of emotion where bodily changes are also part of the process) it is reasonable to conclude that the animal must be formed of a body and a soul.

4. *The Psychosomatic Oneness of the Animal*

But even more important, from the standpoint of the essential elements in its make-up, is the biological oneness of the animal, since it forces us to the further conclusion that body and soul are not complete in themselves, but only parts of a substance that is one. Thus, it was obvious to Aquinas, as it is to the scientist today, that a sensation or an emotion is a unit of experience, though manifesting features that are at once psychic and somatic. But surely what is one in effect must be one in cause! So that only on the grounds of a psychosomatic unity of the animal's nature is it possible to explain such unity of experience. The same conclusion is indicated, on more general grounds, by studying each concrete act of the animal within the framework of its final perspective. For then it is seen that knowledge, appetition, and outer behavior are all united in a single purpose which is the welfare of the or-

ganism as a whole. But if oneness of action is due to oneness of nature, what is the ultimate cause of this oneness of nature? The only reasonable answer, according to St. Thomas, is oneness of substantial form. Thus "an animal would not be absolutely one if it had several substantial forms. For, nothing [in the world of corporeal substances] is one unless it has only one form, which is also the cause of its existence—since existence and oneness are derived from the same principle."

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I. THE PRINCIPLE OF CONTINUITY

Life in the world around us presents the picture of an unbroken whole. It suggests a comparison from the field of mathematics. For, just as there is a potential triangle in every four-sided figure, and a potential quadrilateral in every five-sided figure, so, in the words of Aristotle, "living beings make up a series, each successive term of which potentially contains its predecessor." Nature, to all appearances, is activated by some hidden force that enables it to tie together all levels of life and to fill up gaps when there is danger of a break in the regular arrangement. As St. Thomas puts it (and this is his formulation of the principle of continuity): "Higher nature, in its lowest degrees, touches lower nature in its highest degrees." What he means, to be sure, is that living things are separated into different orders of being; and that one order has an intimate relation with another. But this is so obvious a fact that I feel sure there was a deeper and more dynamic reading of the principle in the mind of Aquinas. The law of life is a law of progressive development; and its expression in the principle of continuity can very well cover, not only the actual facts of continuity, but also the internal movements of organs and powers by which one type of life is brought into closer contact with another. Such movements would imply at least two things: first, a more perfect unfolding of the bodies of organisms; secondly, a wider and more excellent use of their powers. All that Aquinas would ask of an evolutionary theory is that it begin with the datum of life; and that it retain the essential distinctions of plant from animal, and of animal from man.

II. THE PRINCIPLE OF CAUSAL PROPORTION

As a background to his treatment of the problem of creation, St. Thomas employs another basic formula which, like the preceding, may also be cited in favor of a developmental position. Expressed very briefly it says that "the power of a cause is proportionate to the number of effects that it is able to produce by its causality." What it means, in its context of creation, is that not every particular event in the universe needs the special intervention of the Creator. On the contrary, since He is infinite in power and in absolute command of the movements of creatures, He can bring about results by using secondary causes. Such, of course, are nature and the laws

that control its workings. This, for example, is the way primitive matter could have slowly emerged into its present cosmic pattern. This also is the way it could have been disposed for the reception of a living form. Finally, this is the way plants and animals could have developed to their present stage of perfection, should science make it certain that evolution took place.

3. *Evolution and Species*

Applied to the *individual,* evolution means a gradual and progressive development of an organism away from its parent stock. The change, in this case, must be in the nature of a perfection, since the evolutionary process is properly understood as an unfolding of latent powers, a germination of the seeds of greater excellence, a passing from a lower to a higher condition of existence. At the same time, it also implies the inheritance and propagation of new specific characters.

Applied to the *group,* the growth and progression which we have just described must affect a whole class of individuals; with the result that this particular group is now clearly set off from other groups by its possession of dissimilar traits that can be transmitted to its offspring. It is hard to fix the limits of such development; but the word "species" is used by the scientist to mark these differences. The term is a critical one and has occasioned a great deal of controversy. Since it is also employed by the philosopher, we must be careful to distinguish between the two meanings that are attached to it.

I. SCIENTIFIC SPECIES

The scientist speaks of species as either natural or systematic. By *natural species* he understands the primitive plant and animal groups from which our present systematic species, genera, and families have been derived. In its singular form, it represents an autonomous series of living beings, or a group of organisms that is unrelated to any other series. With our present knowledge, it is impossible to say how many separate lines of ancestry exist on the earth. The problem must be left to further research, though it is doubtful if it ever can be finally settled.

Systematic species has a more clearly defined meaning in the mind of the scientist. Such a species is made up of a group of in-

dividuals that, first of all, agree in form, size, color, and other similar characters; secondly, interbreed freely where the normal mode of reproduction is bisexual; and thirdly, transmit their proper traits unchanged, or with such modifications as come from a new environment or from new modes of breeding. As far as science is able to observe, systematic species always remain the same, even under altered conditions of time and place; and the modifications they undergo do not extend beyond the producing of new varieties within the same species.

II. PHILOSOPHIC SPECIES

According to Aristotle and St. Thomas, matter is specified by form. That is to say: the union of primary matter and substantial form brings into being an individual of a definite species. Further, the various grades of perfection that we see among corporeal creatures is the result of an essential difference of forms. This is the reason that an element or a compound, as a species of nonliving matter, is distinct by nature from an organism. But among living things, too, there are essential differences of form, giving rise to further distinctions of species. Thus, the soul of a plant is substantially different from that of an animal; and the soul of an animal is substantially different from that of a man. From the standpoint of philosophy, therefore, we can distinguish three species of organisms. It is obvious, of course, that each of these substantial species embraces a large number of individuals; and that such individuals may be grouped, for the purposes of science, into natural and systematic species. But the differences between the individuals and groups that make up a philosophic species must always remain purely accidental. To sum up, then, in terms of the teaching of St. Thomas: a philosophic species is one, the members of which share the same essential nature and operate by means of the same essential properties; and looked at in this way, there are only three species of living bodies: plants, animals, and men.

Part II: THE EVOLUTION OF SPECIES

1. The Probable Fact of Evolution

It is to be noted at the outset that the best accounts of evolution, given by modern science, begin by assuming the existence

of natural species. The point to be settled is not how they originated (since that is a problem for the philosopher and will be discussed in section IV of this chapter) but *if* and *how* they developed into the systematic species with which we are familiar today.

I. PALEONTOLOGY

Most scientists take it as fact that the earth has stood for over 1500 million years—quite a different figure from the one ventured by Ussher three centuries ago, who put the time of creation at nine o'clock, on the morning of October 26, 4404 B.C. Within such a vast expanse of time, the contour of the globe on which we live has changed repeatedly, with mountain ranges rising and wearing away, trapping the creatures of different periods in the sedimentary deposits formed from their decay. From the fossil remains thus left behind, the developmental processes of a large number of plants and animals may be studied.

Careful surveys reveal: first, that large groups of well-organized types of life existed in the remote ages of our planet; secondly, that later organisms were more complicated in structure than earlier ones, though this rule is not without exceptions; thirdly, that the most recent fossils are closely related to species now existent. The facts are interesting and not without value. Yet they present a fixed rather than a mobile picture of life; so that it would be a mistake to presume that the gradual unfolding of species is a necessary corollary of the series of pictures revealed by paleontology; or, more simply, that evolution is the same as history. Further, there is evidence of degeneration as well as evolution in the fossil record—for example, the remains of certain parasitic plants and animals that are manifestly less complex than the species from which they are supposed to be descended. Science has not yet given a satisfactory account of these deviations.

II. GENETICS

The best foundation for an accredited theory of evolution comes from genetics, which is occupied with living organisms. Thus, if there is any factor which, more than others, controls the movements of reproduction and inheritance, it is the law of constant change manifest in all vital phenomena. By this we do not mean that the variations in organisms, observed by the geneticist, are great within any given period of experimentation. On the con-

trary, as we pointed out before, only slight modifications have come to light, and never anything in the nature of a true change of species. Change is indicated, nevertheless; and when we remember the long intervals of time that separated the simpler from the more complex types of organisms, there is a strong antecedent probability of a theory of progressive development. At any rate, genetics shows us that living bodies are always undergoing alterations; and that certain of these changes, in the same group of organisms, are handed down to succeeding generations. Here we are striking at the roots of the problem of transformation. For, it is plain that the appearance of new species demands not only the acquisition of new characters, but their stable inheritance as well.

It was August Weismann who gave final shape to the idea, already widely discussed in scientific quarters, that every organism is made up of two kinds of substance: somatoplasm, and germ plasm. The former is not active in the process of heredity, but simply serves as a protective environment, a source of nourishment, and a vehicle of movement for the latter. Each germ cell, in turn, is composed of cytoplasm and a nucleus; and it is in the nuclear matter that we find the chromosomes and genes which are the actual carriers of inherited traits. Thus, if speciation took place in the past, it must have been brought about by a series of changes in the number, quality, and arrangement of genes. Now, the findings of biology reveal that many, perhaps most, acquired modifications are not capable of being transmitted. But they also show that changes in somatic plasm can sometimes affect the germ cells; in which case, a hereditary process is set up. The point of capital importance, deriving from the evidence, is that somatic and germinal cells are not functionally independent of one another. If they were, the development of species would have been a biological impossibility right from the start. At the same time, to make sure of a process of development, nature must find some way of reconciling things that seem to be at opposite removes: on the one side, the tendency of heredity to keep organisms within bounds of their species; on the other, the need of a change in germ plasm before new species can come into being. The next step in our study, therefore, is a search for such causes as may have gradually succeeded in modifying germinal tissue.

III. ACTIVE FACTORS IN NATURE

The physico-chemical environment contains several elements which, in the course of time, could have influenced the body of an organism and thus, indirectly, affected its germinal cells. The first and most obvious factor is *food;* and its function, as an agent of change, may be inferred from the fact that it furnishes the materials out of which every cell of the body is built. It is the source of physical energy; and without it, living on earth would be impossible. Yet, the actual supply of it is never equal to the rate of potential increase among organisms. *Climate,* too, is connected with the growth and development of the body. It includes such variable items as heat and cold, dryness and moisture, sunlight and cloudiness, high and low air pressures, wind currents—in short, all the elements of weather to which adaptation must be made if plants and animals are to survive.

The effects of both food and climate are best studied in the *new geographical distributions* that have separated members of the same family. For example, the kangaroo of Australia and the American opossum are unquestionably related since both are marsupials, carrying their young in a pouch on the abdomen. Their wide separation in habitat can be accounted for on the evidence that a land bridge at one time united the two continents; while the differences that have resulted in their general appearance may be due to the changes in their physico-chemical surround. Another interesting case is the lung fish which apparently started off as a gill-breather, but developed new respiratory organs when the waters of the lake in which it lived began to dry up.

As a final factor, it is pointed out by the biologist that nature tends to improve those parts of the body that function a great deal; whereas those that are inactive appear to wither and degenerate. Phenomena of this kind are cited as expressions of the law of *use and disuse.* Man's organs of smell, for example, are said to be slowly deteriorating; though there is no special reason, except failure to use them more actively, why they should not be as good as those of the animal. Now, all the foregoing factors show secondary causes at work; and their influence on organisms, in the course of long centuries—first on somatoplasm, then on the germ cells—may

help to explain why the trend of heredity to conserve, is not really opposed to the idea of a change in species.

IV. COMPARATIVE STUDIES

Likeness is not a proof of relationship. Yet, if two separate species of organisms have had a common ancestral line, we should expect to find certain similarities in their structures and functions. While the evidence which follows is factual, then, it supposes rather than proves the truth of an evolutionary process.

Anatomy is one of the most fruitful fields for a comparative study of species. Practically any system of the body can be used, such as the arrangement of bones, the alimentary tract, the organs of locomotion, and so forth; but the best work, perhaps, has been done on the nervous system. Thus, beginning with *Amphioxus,* which is the lowest organism in the scale of vertebrates, it is possible to build up a series of structures of gradually increasing complexity, embracing spinal cord, hindbrain, midbrain, and forebrain, until we reach *man,* in whom presumably the nervous system has reached its greatest development. A continuum of this sort is the thing we should look for, if evolution took place. But as we said a moment ago, the relation of the less complex to the more complex, in both structures and functions, has to be established from some source other than similarity, before the comparative value of the evidence is meaningful.

Embryology has established two facts of importance for a theory of evolution: first, that the prenatal history of certain organisms is often the sole guide to their proper classification; secondly, that some of the stages of individual embryogenesis can be explained only by reference to the life story of the race to which the individual belongs.

As an example of the first fact we have the case of *Sacculina,* which lives on the abdomen of the crayfish. To external appearances, it is no more than a blob of protoplasm with a small rootlike projection extending to the body of its host, through which it absorbs the fluids that sustain its life. Yet the embryo of this tiny parasite has a clearly marked shape, with jointed legs and other features that place it with certainty in the family of Crustacea. To illustrate the second fact, there is the whalebone whale. In its fetal stages it has teeth; but as an adult, it shows only dental

plates. Now, the findings of paleontology reveal that at one time whales were equipped with teeth which they retained throughout life; so that what we see in the fetus today is a phylogenetic reminiscence of something that was once useful to the adult members of the family. Instances of this kind, as Eric Wasmann remarks, go a long way towards proving that the theory of evolution is at least probably true, since they admit of only one interpretation. The possibility of similar reminiscent stages in the embryonic life of man, will be taken up in a later section of this chapter.

Physiology offers several points of comparison, but most of them are of indifferent value for an evolutionary theory, especially when laid beside the facts just cited from the field of embryology. One piece of evidence, however, that seems quite impressive, is drawn from comparative serology. Thus, if a small amount of the blood serum of any animal is injected into a guinea pig, the foreign blood acts as an *antigen;* that is to say, it causes the production of antibodies that will precipitate and destroy the antigen introduced into the guinea pig's blood by a second inoculation. Now, such reactions are highly specific, in the sense that the antibodies which cause the precipitation of the blood of one species are generally powerless against the bloods of other species. For example, a serum that has been immunized against the blood of species *A* will precipitate the bloods of species *B, C, D,* and so forth, in decreasing degrees as the relationship of A to these other species diminishes. To make the matter more concrete: the serum from an animal that has been immunized against human blood is divided among five test tubes. Then the serums from man, an anthropoid ape, an old world monkey, a new world monkey, and a lemur, are added. The amount of precipitate formed, in each case, decreases in the order that I have here mentioned. Hence it is concluded that some kind of blood relationship exists between man and the animals used in the test.

V. CONCLUSION

The majority of scientists today admit evolution as a probable fact. From findings in several distinct fields of research they have been led to conclude that our present species, genera, and families, in both the vegetative and sensitive orders of life, represent the close of a progressive development from primitive natural species.

How many of the latter existed at the beginning it is impossible to say. But, since the past record of all the great plant and animal phyla gives no sign of their having been related, or of having branched off from a common stock, it would appear that polyphyletic evolution (with several lines of ancestry for both plants and animals) is the likeliest inference from the available facts. Gustav Steinmann, a paleontologist of high standing, goes so far as to declare that the point can never be settled. "I feel certain," he says, "that the oldest representatives of animals and plants of every kind will forever remain unknown to us. All trace of them has probably vanished, owing to the great changes undergone by the oldest strata."

2. *The Probable Mode of Evolution*

If we admit evolution to be a probable fact, as the evidence seems to indicate, our next task is to give some reasonable account of the manner in which it took place. Several explanations have been offered; but no single one can lay claim to completeness as a principle of speciation. A composite picture, with elements from all theories, may appear at some future time as the most acceptable scientific description of the evolutionary process.

I. THE DARWINIAN THEORY

The Darwinian theory proclaims the idea that, as a result of the struggles, accidents, and numerous other vicissitudes that occur more or less spontaneously in the history of organisms, nature allows only the fittest to survive. This concept was not original with Darwin, although he did more than any other investigator to set it on a solid scientific basis. But at least 600 years before the Christian era, the Greeks had begun to speculate on the problem of evolution, its causes, and the several ways in which it may have occurred. Empedocles of Agrigentum, for example, is on record for having made some quite clear statements about the selective powers of nature.

The theory of Darwin has been brought up to date by men like John B. S. Haldane, Julian Huxley, and Thomas Morgan, who accept it, however, not as an explanation of the origin of new species, but rather as a possible way of accounting for certain kinds of adaptation. It is now generally admitted that survival of the fittest

to those of the plant, so the properties of the animal are designed, in the ordering of cosmic perfections, to be the tools of man's reason and will. From which it is clear, as St. Thomas concludes, that the foresight of the Creator arranged His works in rule and measure, "thereby making manifest the truth of the Apostle's saying: 'All things that are, are set in order by God.'"

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BOOK THREE

INTELLECTUAL LIFE

SECTION 1. THE SCIENCE OF INTELLECTUAL LIFE

Chapter 21
THE HUMAN MIND

1. The Range of Human Abilities

The loftiest reaches of consciousness, possible to any cosmic being, are found in man. Over and above his ability to live and reproduce which he shares with the plant, and to sense and feel which he divides with the animal, he can think and will. Thus, his science and wisdom are surely the most transcendent kinds of cognition to be found in any earth-bound creature; just as his power to choose among means and shape his own destiny is the most perfect form of appetition. He can know the nature of things around him, as well as his own inner essence; and on this foundation, he is able to build up a system of knowledge that unifies all the data falling within range of his experience. Then, with insight as a guide, he can establish certain practical aims and ideals that will give meaning to all his conscious strivings. In the end, it is possible for him to reach the goal that he has set up for himself, by intelligent understanding of his duties, by constancy of purpose, and by fearlessness in meeting the obstacles to his progress. Thought and volition, therefore, form the special contents of human consciousness; and it is with the scientific aspects of these phenomena that we shall be occupied in the present section of our text.

2. Methods of Studying Mental Processes

Man's thinking and willing are the most elusive of all his acts. No amount of ordinary observation will suffice to lay bare the interior workings of his mind, as it produces an idea; or of his intellectual appetite, as it reaches a settled decision. While it is true that his vegetative processes and the simpler reactions of his senses

can be measured to some extent and even paralleled in mechanical experiments, the actual formation of a judgment or a choice defies all mathematical analysis. The ability to fashion an abstract thought out of the data of sense experience, cannot be studied as we study our perceptions and emotions; and there is no formula for predicting the way in which a man will react to the favorable or unfavorable factors in his surround. This does not mean that the methods of the laboratory are altogether inapplicable to the levels of thought and volition. It does mean, however, that the greatest caution must be used in devising the proper introspective tools for probing the depths of these impalpable data of human nature. For, it must be quite clear to every serious student that self analysis, or the exploring of the secret recesses of one's own consciousness, is the only adequate way of learning anything about such immaterial properties as mind and will, and their equally immaterial—though none the less real—contents.

To many psychologists, however, and notably those of the behavioristic school, anything that needs consciousness to establish its reality, appears uninteresting and even useless; in which case, of course, the behaviorist is under no obligation to study such elusive phenomena as thinking and willing. And judging by some of his pronouncements on these matters, it were better that he left them to other and better equipped mind explorers. But no effort on the part of the moderns, to minimize the meaning of the data of mind, can change the essential fact: that the *intellectual* operations of consciousness are the most important of all, as far as man is concerned, since they are the very acts that distinguish him at once from the brute. Moreover, to ignore such things, or to shy away from any scientific contact with them, does not imply either that they are incapable of being understood or that a study of their intangible nature, by long and laborious introspection, will not bring the highest reward. Assuming, then, that they are lawful material for research, the question is not whether psychology is to be cluttered up with what some regard as mystic impedimenta, but how it is to extend its methods into regions where strict rule-of-thumb measurements cannot be employed.

3. *The Meaning of Intelligence*

In the problem on instinct, we referred to some of the loose observations made by the comparative psychologists on the meaning of intelligence. Scientific interest in the problem, with special focus on the mind of man, has been growing since the turn of the century. The work of Alfred Binet, in particular, was a pioneering effort; and his findings gave the first impulse to a long series of experiments intended to test the range and strength of man's intellectual powers. Most of the research, however, has been bent on determining the external criteria of intelligence—such as the ability to do successful work in various fields, skill in pursuing one's avocation, in making the right kinds of adaptation to changing circumstance, in maintaining one's standing and prestige in life, and so forth—rather than towards the more fundamental issue of finding out what it is in itself, and how it works in accumulating knowledge. A notable exception to this rule is the contribution of Charles Spearman and his school. Here the investigator has been at real pains to rehabilitate the term "intelligence" (which certainly was tarnished by unwarranted comparisons of man's mind with the so-called intelligence of animals) and to give it the unique standing it had in the days of Aquinas and Aristotle. For, the teaching of these great scholars on the meaning of mind is perhaps our most precious inheritance from the traditional psychologists; and the failure of the moderns to appreciate what it stands for, in the economy of human life, has proved a stumbling block to progressive research.

Strictly speaking, intelligence is the habit of being intelligent; just as justice is the habit of being just. Moreover, if intelligence, as a habit, is a constant and abiding quality, it also includes the intellectual acts by which it is formed. In any case, to be intelligent, one must have an intellect; and both words, as St. Thomas points out, come from the Latin *intus legere:* to read within. The fitness of the terms may be gathered from the fact that the power of intellect enables its possessor to penetrate beneath the outer appearances of things, and to reach their nature or essence. Intellect, in short, is the ability to lay up abstract knowledge. By means of it, we can generalize and so come to apprehend the substance that underlies accidents, the causes that are behind effects, the remote ends towards which things that are passing and momentary can be directed.

Thus, the notion of intelligence is clear and unambiguous in the writings of Aquinas, and agrees in all essential respects with the teaching of Aristotle. But in the hands of less capable men, the word was destined to give rise to confusions and misunderstandings which led to a travesty of its original scientific and profoundly human meaning. In its last stages of degeneration, it was made synonymous with any sort of cognitive process, including sensation and memory, and applied univocally to man and animal. Small wonder, then, as Spearman remarks, that the search of the moderns for some special connotation to attach to "intelligence" has ended in failure, when men have forgotten or ignored or bluntly denied that only they themselves have the gift of insight.

4. The Principles of Intelligence

In the system of St. Thomas, one and the same intellect is capable of producing three special effects: *simple apprehension,* which is the concept or "word of mind"; *judgment,* which puts together or separates concepts; *inference,* which compares judgments and arrives at a conclusion. Thus, the mind begins "by apprehending something about its object such as its bare essence; and this is the first and proper object of the intellect. Then it understands the properties and accidents that surround and enclose the essence—being moved of necessity to compare one thing with another by composition or division. Finally, from its act of compounding and dividing, it moves on to another operation, which is the process of reasoning."

Now, as a background to our discussion of these mental phenomena, it will be helpful to say a word about the work of the factor psychologist who approaches the problem of intelligence from the standpoint of the testing procedure. According to Spearman, the mind of man is essentially a creative power. Out of its contacts with the objective world, it is able to bring into being new contents which, in turn, give rise to other contents. Careful study of the way it acts shows that it is governed by three principles, representing both the extent and the limitations of creative power: first, the *apprehension of experience,* meaning that any conscious event tends to produce a knowledge that covers, not only the direct attributes of the object arousing consciousness, but the experiencing subject as well; secondly, the *eduction of relations,* by virtue of which the presence of two or more ideas within consciousness immediately tends to

provoke a knowledge of the connection or nonconnection between them; thirdly, *the eduction of correlates,* which means that the presence of an idea and a relation in the mind at once tends to generate a knowledge of some correlative fact. Now if these are our basic intellectual functions, as revealed by the findings of the laboratory, it would seem that the much disfigured meaning of mind is at last being restored to something like its pristine purity; and that science and philosophy are slowly discovering a common ground on which a profitable discussion of intelligence can take place.

Of course, the labors of Spearman and his school are not the only sources of confirmation of the traditional teaching. Other mental testers would appear to be well disposed towards acceptance of the views of Aristotle and St. Thomas. Thus Lewis Terman, who rates as one of the best in the field, says that "an individual is intelligent in proportion as he is able to carry on abstract thinking." Now, certainly this is a statement that would find hearty agreement from the Angelic Doctor. As Spearman also points out: the conception of mind which is pictured for us in the writings of men like Aquinas and the Stagirite, even lends itself to the critical task of furnishing a definition for scientific psychology. Its criterion—*the ability to abstract*—is freer, in any event, from the cloudiness and ambiguity of such descriptive terms as "adaptability," "power of making successful adjustments," "aptitude for being educated," (all of which, in some degree, apply to animal as well as man) that mar so many modern discussions of the problem of intelligence.

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Chapter 22
THE CONCEPTUAL PROCESS

1. The Meaning of Concept

According to St. Thomas, the concept is *an individual conscious content which represents the essence of an object.* The proper object of intellect, in man's case, is always the essence of a corporeal substance, since he himself is an admixture of matter and form. As a principle of knowledge, the concept is also called an *idea.* As a principle of making things, for example, in the mind of the artist, it is known as an *exemplar.* It differs from the products of the interior and exterior senses by reason of its universal and impalpable properties. The whole function of the concept is to reveal the nature of things—a task that is obviously beyond the limits of a sensitive power. In the words of Aquinas: "The outer senses do not apprehend the essences of their objects, but only their external accidents. In the same way, the inner senses know only the images of bodies. It is intellect alone that penetrates to the essence of things." The work of intellect is defined, in its strictest terms, as an abstraction from the concrete; and since this implies a piercing of surface qualities, or a progression from knowledge of accidents to knowledge of substance or nature, we very rightly use the word "intellect" to describe the power of forming concepts. Thus, its movement is from the particular to the general; or from the concrete to the universal—for instance, from the percept and image of the red color of a rose, to the idea of redness; and thence, with further knowledge of qualities, to a notion of the nature of the rose.

In the psychology of Aquinas, intellect is really two separate powers, so distinguished because of the double task that must be performed in every conceptual process. Thus *active intellect* prepares

sion of the object on the exterior sense; secondly, the formation of an image or phantasm by the interior sense; thirdly, abstraction of the nude nature by the active intellect; and fourthly, production of the concept by the possible intellect. Let us look at the procedure in greater detail.

Knowledge, as we learned in another part of our book, is a separation of form from matter; and intellectual knowledge begins with the senses. Now, the object of sense is made up of two physical elements: matter and form. It makes an impression, or a series of impressions, on an end organ. There is a vital response; and in the course of the movement, an intentional form of the object (distinct from its physical form) is generated in the sense power. The purpose of such a form is to determine the power to know. Since objects, as a rule, present themselves to several outer senses, according to the distinctions of their material qualities or attributes, several intentional forms are brought into being. All these presentations of sense are unified by common sense and become, in turn, a stimulus to the formation of phantasms by the re-presentative powers: imagination, memory, and estimative or cogitative sense. The point about the phantasms which is important for the process of conception, is the fact that all are synthesized products; and that each, as St. Thomas says, is a potential idea. This means that the disjointed and unconfigured masses of information, which arrive in consciousness through the avenues of the exterior senses, must be resolved into unity by the interior senses before the intellect can start to work on them.

The phantasm, therefore, is the true point of departure, in the natural order, for all our intellectual operations. Its mere presence is enough to throw the mind into motion. Thus, immediately upon its appearance, active intellect sets about its work of abstraction—disregarding all the material conditions that are found in the phantasm and that represent the object as a particular and concrete thing; and then, by a flash of its intuitive and penetrating power, disclosing the essence that lies buried beneath the individuating notes of the object. The nude nature, so revealed, is also an intentional form; but it differs from the intentional form that is produced in the senses. Thus, while the latter represents the object under its individuating conditions, the former has left all such notes behind. Or to put it in another way: if the sensible species, which is the prod-

uct of sense, represents the object *in the concrete,* the intelligible species, which is formed by active intellect, represents the object *in the abstract.* In short, the species or intentional form of sense is material in nature, since it arises from a power that is material; that of active intellect, on the other hand, is immaterial. With the production of such a matterless form, possible intellect now has a stimulus that can arouse its own immaterial energies. Once impregnated with the species of active intellect, it is able to give expression to

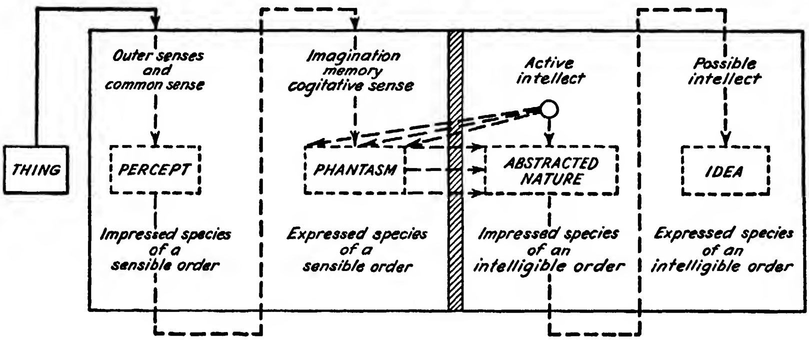

FIG. 28 The birth of the idea. Note that the actual presence of the object impinging on the outer senses makes it unnecessary for them, or for common sense in which they are immediately rooted, to form an expressed species.

its own creative power by producing the concept: the conscious content which, as we said at the opening of the chapter, represents the essence of the object that it knows.

A theory of this kind avoids two extremes: first, that of supposing our knowledge to be a complexus of sensations and images; secondly, that of accounting for our thought-forming processes with no reference whatever to the rôle of the senses. The first represents the tradition of Democritus in psychology; the second, the position of Plato. It is scarcely necessary to add that the teaching of St. Thomas is in direct line with the psychology of Aristotle.

3. *The Task of the Phantasm in Intellectual Knowledge*

While sense and intellect work together in the production of the concept, the dependence of the latter on the former is *objective* only. That is to say: the task of sense is simply to present the object to intellect by the various stages that we have just portrayed,

ending with the formation of a phantasm, which is the datum on which active intellect works. Of course, once the phantasm is brought into being, there is no need of repeating the sensations and percepts that led up to it, since the images of what has been experienced can be stored away and recalled. The point to be stressed here, however, is the utter lack of proportion between the phantasm, which is concrete and particular; and the idea or word of mind, which is abstract and universal. Yet the idea is truly dependent on the phantasm, since it is only through the product of sense that mind can come in contact with its object. In fact, as far as observation goes, it would appear that intellect never operates without the employment of images. As Aristotle says: "To the thinking soul, phantasms have the same relation as a sensible object to the senses." But it is plain that there is no sensation without the presence of an object impinging on the organs. "So," concludes the Stagirite, "there is no thinking without the presence of a phantasm." St. Thomas, too, is firm on this point; and in favor of his view, he notes, first, the general tendency of mind to adduce palpable examples, in an effort to clarify its understanding of a problem; secondly, the familiar habit of trying to visualize things that are actually incapable of being seen, such as energy, power, and substance; thirdly, the fact that a man born blind has no conception of color, since there is no phantasm from which he can abstract an idea.

The natural dependence of intellect on sense, is simply an expression of the more general dependence of mind on matter, or of the soul on the body. This is so critical a part of the teaching of the Angelic Doctor, that it merits a special word. Aristotle had said: it is not intellect that understands, but *man* by means of his intellect. Now, man is a union of soul and body; so that the latter may be said to have a share in the formation of his thoughts. The fact is, of course, that no idea appears in consciousness until after a long process of preparation has been gone through, in which vegetative as well as sensitive functions have a part to play. Experience, "which comes from much memory," is a slow product of the senses, both exterior and interior; and a clearly-recognized physiology is at the base of all such movements. So that it is not only from a background of organic processes, but also in correlation with and reliance upon the acts of the body and its senses, that our intellectual operations take place. Thus, as St. Thomas teaches: no one thinks, even if he is

only calling back to mind ideas that have already been acquired, without summoning up a whole manifold of images, memories, and emotions which form the cultural medium of his intellectual processes.

Moreover, when we want to awaken a thought in somebody else, how do we go about it? By making use of a word or a sign which, first of all, rouses his hearing or sight, then acts as a spur on his imagination, memory, and emotions—thereby creating that medium in which he will discover our idea and possess it as his own. From this point of view, it is only through the body that we can communicate with the mind. At the same time, Aquinas insists with equal vehemence that the power of intellect itself, along with the acts that it produces in abstracting and understanding, is completely devoid of matter. Indeed, matter and intelligence are at opposite poles; and it is only when the image or phantasm is emptied of all its material connotations, that what is potentially understandable in it can become actually understandable, and so contribute to the formation of the idea.

4. *Experimental Studies*

Research in the field of both normal and abnormal psychology has confirmed the observations of St. Thomas on the general nature of our concepts. An unstructured sensation of sound, for example, passes over into the synthesized percept of a word; then into a patterned verbal image; and finally into a meaningful insight, when intellect exercises its faculty of understanding. None of these stages can be denied. Furthermore, the significance of abstract words, like *virtue, motherhood,* and *wisdom,* is not derived from the tonal quality of the word, as such. Each sensation, percept, and image is concrete and particular, limited to a here-and-now experience of its object which is just as concrete and particular. A thought, by contrast, is essentially universal in its range, unbounded by the dimensions of time or place, inasmuch as its content can be applied unchanged to every specimen—past, present, future—that falls within a given group. This is the most important feature of the experimental findings; and it establishes securely an order and distinction between cognitive events that are sensitive and material, on the one hand; and intellectual and immaterial, on the other.

The studies of August Messer and Karl Bühler, and especially

of the latter, have led to the formulation of the *theory of imageless thought*. There has been a great deal of dispute about the terms of the theory; but an objective reading of the findings on which it is based, indicates that conceptual processes, though introspectable, are not themselves of a perceptual or imaginal nature. In other words, there is something else in our intellectual awareness of an object besides the phantasmal picture that accompanies the procedure. Alfred Binet has previously arrived at the same conclusion from his experiments on the intelligence of his daughters; and Robert Woodworth has since corroborated the theory. To be sure, others may be found who deny the nonreducible character of the concept. John Watson, for instance, would make it the product of reflex activity; and Edward Titchener maintained that it is merely an etherealized sensation, or a faint, fleeting image. The balance of scientific evidence, however, is in favor of the view of Bühler; and it gains weight from the fact that it has resulted from techniques designed particularly for the study of thought processes, by men who were experts in this special area of research.

Further efforts have been made in the laboratory to verify the need of phantasms in the production of a thought. The results have been somewhat vague—judging by the reports of the subjects who sat in on the experiments. Thus some, according to Bühler, seemed to experience thoughts without images; while others declared that such images were present, especially in the case of their longer-enduring ideas. Alexander Willwoll has made a thorough examination of the findings of Bühler; and his interpretation confirms the teaching of St. Thomas on the ontological need of phantasms for the process of ideation—a need, in fine, that is a law of man's nature, since his intellectual soul is also the form of his body.

The successful outcome of experimentation of this kind, it seems to me, depends on two things: first, the type of material that a subject is asked to introspect; secondly, the insight and skill with which he makes his report. It should begin, as Johannes Lindworsky points out, with objects of commonplace experience, and should be carried through with the closest possible scrutiny of the manner in which we recognize such objects. To illustrate: if we are looking at a horse, several facts at once become obvious. It has a definite size and shape; four legs; a long tail; short ears; a mane and so on. Now, some of these facts apply to all horses; others to a certain number,

only; others to other animals. The sum total of those facts that are capable of being predicated of *all* horses represents our concept of horse. Moreover, the facts that can be applied to all horses are of a general character, by their very nature, and as such cannot be reproduced by a palpable image. Yet, no single fact was obtained in the first instance without a concrete picture of a body, legs, ears, mane, tail, and so forth. Moreover, the facts here indicated also include certain relationships, such as those of likeness and contrast; and these, too, are apprehended only by an abstraction from the contents of palpable images.

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Chapter 23

THE JUDICIAL PROCESS

1. The Discursive Nature of Man's Intellect

Aquinas tells us that the human mind does not reach perfect knowledge by its first apprehension of things. Because it is the property of a form that is united to a body, it must expend itself in repeated effort, seizing on one trait, then another, adding idea to idea, before anything like complete information is achieved. It does not intuit. Rather, the method proper to it is one of *discourse* which is the method of "running about" its object; approaching and then retreating; looking this way and that; examining details and adding insight to insight. Thus, the original impression that it gets of its object is usually loose and unrefined. So it must undertake to enrich its concepts and make them more precise, by successive acts of judgment. A determinate knowledge of properties and accidents—those things that "surround and enclose the essence," as St. Thomas graphically puts it—must be joined to first apprehension, before the object is grasped in a full and compendious manner.

Yet, even to those with the highest gifts of genius, reality seems to have an elusive quality, a constantly receding yet enlarging horizon, that outstrips all the notions we are able to form of it. At the same time that it nourishes and sustains our mental life, it fails to be exhausted by it. As Leon Noël profoundly observes: "Reality precedes the first awakening of the mind and precedes as well its every later step, retaining an independence which continues to be more fully realized with the very progress of thought." So that even after a lifetime of searching for the treasures of science and wisdom, we shall likely feel inclined to think, with Faust, that we are not even a hair's breadth nearer the summit of Truth which is infinite in its reaches.

2. *The Notion of Judgment*

From the standpoint of psychology, a judgment is *the conscious expression of the relationship that is conceived to exist between certain objects.* Because it is a conceptual kind of apprehension, it has an abstract character that distinguishes it at once from the apprehensions of the animal, which are always concerned with particular items of experience, grasped in a concrete way. According to St. Thomas, the forming of a judgment is a matter of mental composition or division, since it either affirms or denies one thing of another. Here, precisely, the uniqueness of the intellectual power is made manifest: when, standing apart from the reality that it surveys, it is able "to distinguish elements that are actually united, and unite elements that are actually distinct." Three factors are expressed or implied in every judgment: a subject; a predicate; and the intellectual awareness of their mutual inclusion or exclusion. We say, for instance, that *the sky is blue;* and each part of the proposition—the notion of *sky;* the notion of *blue;* the notion of the copula *is*—represents an outgrowth of the concept-forming process which we described in our last chapter.

The essential function of the judgment, therefore, is understanding the relationship of predicate to subject—a relationship, let us repeat, which is one either of inclusion or exclusion. Aquinas strikes at the roots of the procedure when he says: "The proper object of the human mind is the essence of material things. . . . Now, in every material thing there is a twofold kind of composition. The first is that of form with matter; and to this corresponds that compositive action of the intellect wherein the universal whole is predicated of its part [as when we say, for example, that *man is a rational animal.* For here, *animal* is the generic whole, of which *rational* and *non-rational* are the specifying parts]. The second composition is that of accident with subject; and to this corresponds that compositive action of intellect wherein an accident is predicated of the subject in which it inheres; as when we say that *the man is white.*"

Assent to any given judgment is another matter. It depends on whether the compounding or dividing of ideas conforms to our apprehension of reality, or whether we have some extrinsic reason for giving or refusing our intellectual approval of what is expressed in the judgment. For example, some one says: *psychology is both a*

science and a philosophy; and we understand the statement correctly, first, because we know what psychology is; secondly, because we also know the definitions of science and philosophy. Yet, our comprehension of the judgment, according to its individual terms, does not necessarily mean a commitment to the truth of the proposition. The point I wish to make here is that the motives of assent can arise from sources other than internal evidence, such as one's training or bent of mind, expectations, preferences, prejudices, feelings, and so forth. The last-named factor is worthy of special note, since emotional states are often confounded with judgment itself, when, in fact, they are only movements of the sensitive appetites, either in favor of or opposed to the trend of the intellectual movement.

3. *The Judicial Process*

As soon as intellect begins to work, it spontaneously becomes aware of the relations that exist between things. Thus, when we are looking at two objects, it is natural to "compare notes," as the common expression has it, in order to determine their likenesses and differences, their equalities and inequalities, and so forth. The findings of mind, in such a case, constitute the apprehended relations of the two objects. It is in this way, for example, that we discover the properties common to man and the brute, and then judge both to be animals; or bring to light other properties belonging to man alone, and then judge him to be a rational animal. Sometimes the relationship is established between different aspects of the same object, as in the case cited above, where the mind links human nature with a color and says: *the man is white.*

It is not to be thought, however, that every time two or more separate facts are presented for the consideration of the mind, it immediately sets them side by side so as to bring out their characteristic qualities. On the contrary, it has been demonstrated that we can remain entirely unresponsive to comparable data. For instance, two equal triangles may be presented within a field of vision that includes several other figures, without our becoming conscious of their equality. The fact is that this sort of thing is happening to us all through life; and acquiring new insights or deepening old ones is largely a matter of seeing connections between objects that we never thought to exist before. In any event, the important feature about the judgment is its *intellectual* awareness of relation-

received in sense represents the object precisely as it is singular. The form received in intellect, on the contrary, represents the object under the aspect of its universal nature." Even so superior a form of knowledge as the instinctive prudence of the animal, which Aquinas sometimes refers to as a kind of judgment, does not rise above the level of the concrete.

Again, the reports of the senses are always concerned with the material qualities of the cosmos, which they represent in a particularized and extended way. But no amount of introspection reveals any length or breadth or extended features in the idea—except in a figurative way. Moreover, intellect is occupied with essences, and not with outer material qualities as such—even when it is dealing with corporeal substances which are its proper objects. As St. Thomas puts it: it is the function of sense to "apprehend the external accidents of a thing, such as its color, taste, quantity, and the like; whereas intellect penetrates to its very core. And because all knowledge is perfected through a likeness which is wrought between the knower and the object known, it follows that there must be some likeness of the sensible thing present in the senses—but only in respect of its external accidents. In intellect, on the other hand, the likeness is of the essence."

Finally, cognitive phenomena, arising from the senses, can have several stages of intensity. A sensation, for instance, can be weak or strong, according to the nature of the stimulus. Besides, there is such a thing as a saturation point in the process, beyond which the sense cannot be further stimulated. But to speak of intensity or saturation in the judicial movements of intellect is meaningless, since the relation between subject and predicate is either apprehended or not apprehended. Whether the connection is right or wrong is beside the point. It still remains true that there is no material intensity about an act of judgment. Once more St. Thomas has some interesting remarks to make on the subject. Thus, "the impression of an object on a sense organ is accompanied by changes in the body; so that an unusually strong stimulus corrupts the sense. This sort of thing, however, never happens to intellect. On the contrary, the mind that understands the highest intelligible objects is all the more able to understand those of a lower order." Not, adds Aquinas, that matter does not have some influence on mind! All of us are aware that when the body is weary, it affects our intellectual operations.

But this, says St. Thomas, happens only accidentally, "inasmuch as intellect depends on the acts of the sensitive powers for the preliminary work that leads to the production of phantasms."

5. *Experimental Studies*

There are always difficulties involved in going back over the process of a judgment, once it is done with; so that the results of experimentation are not altogether satisfactory. Karl Marbe made a brilliant effort to study the inner structure of the judicial act; but his findings were chiefly negative. Thus in comparing weights, his subjects were hard put to it to know how they arrived at the notion of *heavier than* or *lighter than,* in estimating the comparative pressures of objects held in the hands. What they did record, however, was the fact that, despite an abundance of sensations, images, and other data of a sensitive nature, these latter appeared to play no intrinsic part in the act of formulating a judgment. Taken in conjunction with the findings of Georg Müller and his pupils, the work of Marbe also confirms the traditional teaching: that a judgment does not consist in the comparison of the actual percept of one object with the revived image of another—though the data of sense supply the materials from which the judgment is eventually formed by mind.

On the positive side, we have experimental results to show that a judgment is always concerned with relationships apprehended in a universal manner. Thus its impalpable nature, and the fact that it cannot be reduced to any kind of sensitive product, has been established by August Messer, who made several improvements on the methods of Marbe; and the conclusions of Messer, in turn, have been verified by the work of Franz Brentano and Johannes Lindworsky. The results show that for a genuine judgment, all that is needed is an intellectual consciousness of the connection between the cognitive contents of mind: in which case, the faculty proceeds by composition and division, as Aquinas describes the movement: formulating positive and negative judgments about things; and extending its knowledge to something which is not given in its original concepts or first simple apprehensions.

Of course, it is common to make mistakes, either because we affirm relationships when they do not exist; or because we deny them when they do exist. This leads us to our final observation here:

that truth and falsehood, properly speaking, are found only in the judgment, and not in the simple apprehension of essences. And fortunately for us, we can be conscious of the error, when we have fallen into it; just as we can be conscious of the truth, once we have got hold of it. But whether true or false, in each case where a predication has been made, a genuine judgment has been formed; and that is the thing in which the psychologist is interested.

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Chapter 24
THE INFERENTIAL PROCESS

1. The Meaning of Inference

As St. Thomas observes, if our minds saw all the truths that can be drawn from a principle the moment it comes in contact with that principle, there would be no need of discourse or a process of reasoning. But this is not the case. Experience bears out what was explained to us by Aquinas on a previous page: that the first act of the mind is a simple apprehension of the essence of its object; that this is followed by a more detailed knowledge of the properties, accidents, and various relations of the essence; that from the acts of mental composing and dividing here implied, intellect goes on to further compositions and divisions, thus setting up a process of reasoning. If judgment, then, arises from a comparison of two concepts, inference is the result of laying judgments side by side and extracting further information from their contents. We may define it as *a special achievement of intellect which, from already existing knowledge, makes accessible a new apprehension of relationships.* It is illustrated in the analytical type of crime story where the reader is given all the vital clues and challenged to make his own solution of the case. Obviously, the derivation of new mental contents means a widening of our intellectual vision; yet apart from its manner of origin, which is an emergence of additional information from our present stock of ideas, the inference is not essentially different from the judgment. The fact that we can reason thus is the clearest proof of our title to *homo sapiens*. In the words of Aquinas: "Thinking is the operation proper to man, the act that sets him apart at once from animal, plant, and non-living creatures; because thinking means the occupation of the mind with universal and incorruptible ideas."

2. The Inferential Process

According to St. Thomas, we are able to infer for exactly the same reason that we can form judgments: because of the intellect's power of discerning the inner abstract relationships of things. In both cases, the procedure is resolved ultimately into the special task of putting together or separating our concepts in a mental way. Since we cannot arrive at full knowledge of an object by simple apprehension, it is necessary to compose and divide; then to proceed to further analytic and synthetic judgments; and by this devious method, to arrive at conclusions that are new phenomena of knowledge. Such is the road of discourse which, as Aquinas says, represents a to-and-fro movement of mind. "All movement is from something before to something after. Hence the knowledge of discourse means that, from what was previously known, one comes to understand what is afterwards known, that is, what one was ignorant of before. If, however, in the thing understood, other things are apprehended at the same time—for example, as an object and its image are simultaneously perceived in a mirror—then it is not discursive knowledge." This latter is the *intuitive* approach to truth, proper to the angels or pure spirits, but unsuitable to man because of the matter in his nature.

The core of the inferential process consists in an active relating of two or more judgments. Thus, when the connection between one premise and another does not rise to the level of consciousness, there is no genuine inference but only a successive apprehension of ideas. On the other hand, when a positive relation is thought to exist where there is actually none, the fact of our being aware of some sort of link between one judgment and another, makes the conclusion an authentic inference, even though it be wrong. The surest way of arriving at the truth of a proposition is in setting down all the steps by which one logically comes to it. This is what we mean by the *syllogism,* which is simply a mode of thought wherein our reasoning is tested at each stage of its advance. But it is not the way of ordinary mental discourse; and we can reach the truth without making use of it. The fact is, the more usual procedure is to overlook or disregard premises, or to change their order when they occur. Even the trained mind is often unaware of its inferential activ-

ity, and comes to conclusions without noticing the logical elements from which its new truths are deduced.

3. *The Inferential Process in Science and Philosophy*

The distinction between induction and deduction is unimportant from the psychological point of view, since both are types of inference, grounded on an intellectual grasp of relationships. But because induction takes a concrete datum as the first step in its discursive movement, and then works through hypothesis and theory to some general law, it is commonly referred to as the proper method of science. Since deduction, on the other hand, tends to reverse the process by its illation of particular truths from general principles, it is often described as the method proper to philosophy. In practise, however, each way of thinking may be found in both the scientist and the philosopher. Hence the distinction of inductive and deductive methods is not so basic as that founded on the nature of the inference which a given form of knowledge reaches. Thus, the conclusions of science are *proximate,* in the sense that they are mainly concerned with accidents; while the conclusions of philosophy are *ultimate,* since they are chiefly occupied with essences. Each, to be sure, is an effort at a rational explanation; but whereas science is constantly striving to improve itself by reference to further observation and experiment, philosophy is inclined towards a settled point of view in which the truths that lie at the roots of reality are expressed once and for all.

4. *Experimental Studies*

It is *the natural mode of reasoning,* rather than the strict syllogism, which furnishes the point of departure for experimental studies. All the findings clearly indicate: first, that every inference is a distinct cognitive achievement, wherein new forms of knowledge are derived from already existing mental contents; secondly, that these new cognitive phenomena do not require further perception; thirdly, that the reasoning process is essentially a broadening out and deepening of our apprehensions of relationship. Some experimenters insist that the enthymeme, in which a premise is omitted, represents the ordinary mode of reasoning. We say, for example: *man can think, therefore, he is superior to the animal.* Or again:

a plant can propagate; therefore, it is more perfect than a planet. But as Lindworsky observes, to lay too much stress on this type of inference is to unduly exaggerate the *therefore* factor in our thinking, and to neglect the important feature about the whole inferential procedure which is the acquisition of new knowledge. Only when we have doubts about the correctness of this new information and wish to verify it as a basis for further inference, do we feel the need of the *therefore* factor to show the inner connection that exists between our premises and conclusions.

The *syllogism* is a special creation of the human mind and demands a very penetrating study to reveal its inner structure. There are two noteworthy aspects about it that make it different from the natural modes of reasoning. First, the total fact or conclusion arrived at is seldom given from the beginning, but has to be developed. Secondly, the direction of the inference is prepared for by the preferred position of the subject and predicate. It is illustrated by the familiar *every virtue is praiseworthy; but kindness is a virtue; therefore, kindness is praiseworthy,* where the conclusion is reached only after the middle term *virtue* has taken on a meaningful relation to the extremes *kindness* and *praiseworthy.*

5. Memory as a Function of Intellect

In the teaching of St. Thomas, intellect can be conscious of past events, but it does not consider them precisely under the aspect of pastness. That is the task of sense. As a matter of fact, when we think about an object, we lay hold of it in a way that is independent of any spatial or temporal connotations. With sensitive memory, on the other hand, it is essential that the condition of pastness be verified. Such a condition may refer either to the *object* that is recalled; or to the *act* of recalling. Now, from the point of view of object, there is no memory in intellect, since it grasps the essences of things apart from the contingencies of past, present, or future. From the point of view of act, however, it is possible for intellect to be aware of the fact that what it is thinking about now, it thought about at some previous time; and with this meaning, it is correct to say that there is an intellectual form of remembering. Or, as Aquinas puts it briefly: "The notion of memory, as an awareness of the past, is preserved in intellect, not by its understanding the past as something particularized in time and space, but simply

by its realizing that what it [here and now] understands it understood once before."

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Chapter 25
MOTIVATION

1. *Intellectual Orexis*

Just as we have knowledge of an intellectual nature, so we have a kind of impulsion that demands reason or insight for its basis and which, in the words of Spearman, manifests itself in "consistency of action, resulting from volition or will." An orectic tendency, it will be remembered, is the inclination of an appetite to identify itself with an object which is recognized as good. Awareness of the fact that the object is agreeable constitutes what we call the *motive* of the appetitive tendency; whence it follows, says St. Thomas, "that appetites are distinguished according to the diversity of our powers of apprehension." In man, accordingly, we find two levels of appetitive power: "first, will, which is occupied with goods that are known by intellect and therefore grasped in a simple or universal way; and secondly, the sensitive appetites, whose concern is always with goods apprehended by the senses and, as such, particular in nature and limited to here and now." The first step in the awakening of any kind of appetitive movement, then, is knowledge of an object *as good*. The very fact that we are drawn towards it, indicates that it has a special value for us which is cognitively appreciated before it becomes a motive of appetition. Indeed, as Aquinas points out, it is impossible for us to be inclined towards anything except under this aspect of goodness; so that when the object is evil and repugnant, it is the good of the appetite that stirs it to movements of withdrawal.

2. *The Intellectual Motive*

The motive of a sensitive appetite arises from the senses; or, in terms of products, a passion is always motivated by a percept or an image of some sort. But because will is an immaterial power,

its appeal: his temperament; the inclinations of his sensitive nature; the amount of education he has had; the ideals with which he has been imbued; and so forth. There is also the psychological fact that when a particular object is allowed to occupy the mind to the exclusion of other ideas, it is apt to assume proportions of importance that it does not actually possess.

3. *Conditions of Motivation*

Will is a dormant or passive power until it is bestirred to act. Moreover, it does not know what it wants, but must wait on the information of intellect before it can be stimulated. Thus, certain important conditions have to be realized in order to assure its movement.

First of all, *the motive must be clearly established in consciousness.* According to Aquinas, values are powerless to operate on the will unless we are intellectually aware of them. Strictly speaking, then, there can be no such thing as unconscious motivation, or movements of will without a previous apprehension of good. This means that we must first understand the desirability of an object before we can produce an act of intellectual desire. It does happen, however, that the appreciation of a value often engenders feelings of a pleasant or unpleasant nature; and these may remain long after our thought of the good that attracts us has vanished from the level of consciousness. Another factor to be considered is the frequency with which our recognition of values changes. Growth in knowledge and experience, and the lengthening of years, with all the subtle transformations in body habits and instincts that the process of aging implies, naturally bring about many alterations in outlook and attitude; so that what was once thought to be extremely important may come to be regarded as of no value whatever. Under these circumstances, it is easy to understand the occasional haziness that all of us have, from time to time, about our goals, as well as the deceptions of mind that are entertained in regard to what is most desirable in life.

In the second place, *the motive must achieve a suitable strength* before it can move the will. Its mere presence in consciousness is no guarantee that a volition will be produced; and so the strengthening of the value is always an asset in helping us over the margin of indecision. This may be accomplished in several ways: either by

comparing the object we are presently examining with other objects whose defects are well known to us; or by a more searching analysis of the good under consideration, thus revealing qualities that we had not seen in it before; or by combining several reasons or motives for choice, thus creating a total value whose attractiveness is now great enough to resolve our hesitancy. Again, force of habit may also serve to bolster up a weak motive; just as respect for the opinion of others, or the thought that we are supposed by past precedent to act in a particular way, often has the same effect. From all this it is obvious that there are two avenues of approach to will: one direct, through a straightforward presentation of a value which has to be accepted on its own merits; the other indirect, where custom or some other extrinsic factor furnishes the necessary impulse to choice.

4. Experimental Studies

The work of Albert Michotte and Emile Prüm on choice and its immediate antecedents has thrown considerable light on the critical problem of motives. Simple tasks in arithmetic were presented to the subject who was left at liberty to decide between adding or subtracting, multiplying or dividing. The results showed that *before* a decision was reached, the subject first carefully examined the set of numbers with which he was supplied, and then proceeded to evaluate them on a basis of their abstract values, feeling tones, or any other standard of like or dislike that the task had for him. Where a sufficiently strong motive was discovered, the act of choice followed. Should none have appeared up to this point, the need of completing the experiment often decided the issue. If the subject hesitated before an alternative was fixed upon, it was inferred that the settlement of motive was still under debate in his mind. As the number of experiments increased, lower motives became less evident and were supplanted by abstract considerations of duty, compliance with the wishes of others, self-respect, and so on. Between the resolution to perform the task and its actual accomplishment, the subject became conscious of a kind of inevitableness about his action because he had decided to go through with it.

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Chapter 26
VOLITION

1. The Meaning of Volition

That there is a volitional procedure is a conviction shared by the scientist and untrained observer alike. Does this mean that the will-act represents a new kind of psychological phenomenon, irreducible to any datum that we have thus far studied? Several points of view have been advanced. Herbert Spencer, for example, and after him Theodule Ribot, Pierre Janet, Hermann Ebbinghaus, and Leonard Troland explain it as a spontaneous imagery of certain forms of movement to be executed. William James replaces imagery with ideas; while Hugo Münsterberg refers to the will-act as a consciousness of strain. Obviously, this is making a cognitive event out of volition. Wilhelm Wundt speaks of it as a kind of emotional desire that finds its goal in running its own course. Here the explanation shifts to the appetitive level, but remains within the category of sensitive phenomena.

On the other hand, we find men like Narziss Ach, Albert Michotte, Charles Spearman, Francis Aveling, and Johannes Lindworsky, who insist that volition is a special form of orectic activity that cannot be accounted for in terms of images, ideas, feelings, or emotions. This, of course, is also the traditional view of St. Thomas who faithfully follows the teaching of Aristotle. Briefly, for Aquinas the will-act is a unique kind of movement, as simple and immaterial in its nature as the act of understanding. It differs from the latter, however, as love differs from knowledge. Thus, the goal of intellect is to produce an idea, by means of which the object becomes one with the subject. The goal of will, by comparison, is to give birth to an impulsion, whose weight inclines the subject to go out to the object. Moreover, the truth of the object, or the fact that it *is*, is enough to stimulate intellect to know; but only the goodness of the

object, or the fact that it is *desirable,* is capable of inciting will to love. The two powers are not unrelated, to be sure, since, as we said in our last chapter, will must be moved by the knowledge of intellect before it can be awakened from its state of passive repose.

2. *Kinds of Volition*

Aquinas has left us a full description of the movements of will. From his own introspective study of such data, he is led to conclude that volition is an experience *sui generis:* a form of intellectual appetition grounded on reason or insight, and ending in an immaterial union with its object. But not every volition is like every other volition. Thus, there are some things that have the same meaning for will as first principles have for intellect. Happiness, and all that is necessarily linked up with it, represents a good of this sort; and under its influence, will cannot help but desire it. There are other things, however, that have the same meaning for will as conclusions from first principles have for intellect; and since objects like this are always of a particular nature and do not exhaust our concept of goodness, we can accept or refuse them, as we wish. The first kind of will-act may be described as *natural volition;* the second, as *deliberate volition.*

Since natural volition is concerned with the attainment of happiness or of goodness in general, it is always focussed on our final goal. According to Aquinas, it involves three separate movements. The first is *natural complacency* of the will in what is supremely good: namely, to be happy. The second is *intention,* which is the actual addressing of will to its end by those necessary means that make the end attainable. The third is *fruition* or the enjoyment of happiness, precisely as it is attained. These are the most fundamental acts of which will is capable; and they correspond, in an analogous way, to the basic movements of our animal appetites which are *love,* or affective complacency in a sensible good; *desire,* or affective approach; and *joy,* or affective possession.

Deliberate volition, on the other hand, is always occupied with means to happiness: not the necessary means that are implied in intention, and that share in the universal nature of the end; but means of a particular nature, which, because they do not exhaust our idea of goodness, can be willed or not willed, as we see fit. Here again, St. Thomas distinguishes three kinds of movement:

first, *choice,* which is will's election of one particular good in preference to another; secondly, *consent,* which is the application of will, or the addressing of its movements, to the thing that it has chosen; thirdly, *use,* which is will's actual employment of the particular good as a stepping stone to its end. Once more, though not on so basic a level, we notice the analogy of will-acts to the general pattern of concupiscible movements wherein *love* is complacent (as though by a choice); *desire* approaches (as though by consent); and *joy* possesses (as though by use). Moreover, just as all emotions have their final meaning from the first movement of sensitive appetition, which is complacency in a particular good; so all acts of the will, and especially those that are concerned with means, have their final meaning from the first movement of natural volition which is complacency in universal good. To round out the comparison, let us note, with Aquinas, that the same appetitive power can be related to opposite objects, though not in the same way. Thus will, like sensitive appetite, has to face evil as well as good. But it is referred to good, by desiring it; and to evil, by shunning it. "Wherefore, will's actual desire of good is called *volition.* . . . The shunning of evil, on the contrary, is better described as *nolition.*"

3. *The General Features of Volition*

On the negative side, introspection of the will-act reveals that it cannot be reduced to sensations of strain, imagery, feelings, emotions, or even ideas, though all these things can be present at the time that the will is in movement. On the positive side, volition is always associated with a *consciousness of self.* In fact, we may regard it as one of the clearest manifestations of the ego, especially in situations of choice, where the interpolation of self seems to be the only way of resolving the dilemma when goods of equal values are presented to the will. Again, volition always appears as a *spontaneous striving for a goal* which is represented to will as desirable. Some authors include *resistance* among the features of the will-act. This may be true from a moral point of view, in the sense in which the Apostle speaks of not doing the good that he wills; or in the more general meaning of an inherent weakness of will in the face of moral situations. But as a psychological trait, its presence in volition is doubtful. Thus will is bound by its very nature to

love, not to resist, the good; so that the only place where an attribute of this kind might function would be in the case where, checkmated in its impulsion to one good, it redirects itself towards another. More subject to debate still is the inclusion of *intensity* among the properties of the will-act. Here it has been definitely established that strength and weakness have no inner connection with volitional movements; that the will strives for its objective, not with varying degrees of force, but with more or less freedom from such influences as the physical state of the organism, the presence of vivid imagery, strong emotions, and such factors as arise from the personal equation. On the other hand, it is plain that the outward expression of the will-act in language, facial movements, and gestures, is open to many degrees of intensity. The fact is, of course, that there is no such thing as an isolated volition. Just as the soul needs a body through which to operate, so the will-act naturally tends to exhibit itself in some form of outer behavior, in order to make sure of its effective tendency towards a goal.

4. *The Particular Features of Choice*

William James has left us an interesting account of the several ways in which will may manifest its desires when alternatives are available and a special preference can be expressed. Thus, when several goods are presented, and careful consideration shows that one of these has a clear advantage over all others, selection of this particular good means that will has made a *reasonable* choice. If there is suspense before a decision is reached, and impatience at the seeming inability to make up one's mind, so that an object or a line of action is recklessly adopted, will is guilty of an *impetuous* choice. When force of habit, or natural bent of character, or the drift of external circumstances, or general interests supply the motive, choice is described as *acquiescent*. When for some serious reason, like grief or fear or religious conversion, the whole scale of values undergoes a change, forcing one to abandon trivial projects and accept the more serious alternative, choice is said to be *grave*. Finally, when sheer sense of duty, rather than natural inclination, is at the bottom of the will-act, or when, out of pain and struggle with what is decidedly disagreeable, the slow dead heave of will is born, choice is referred to as *conscientious*.

For St. Thomas, the special form that choice takes depends, at

its base, on the kind of deliberation that precedes it. The habit of mind which directs the will in such a case, and lights it on the way to its goal, is known as *counsel.* It is especially needed in order to make reasonable choices—surely the most important of all those enumerated by James. The truth of this statement is not far to seek. First of all, says Aquinas, there is always a great deal of uncertainty about things that have to be done, or about lines of conduct that must be followed here and now. Again, our moral actions are always concerned with singular and contingent events; and this, too, gives rise to doubts and misgivings because of the changeable nature of such individual acts; so that intellect is not ready to pronounce judgment, or to offer the will a motive of choice, until after it has made some previous inquiry. And this inquiry is called counsel. Hence, as Aristotle says: choice is the inclination of will towards what has already been counselled, since its object is "something that we have decided upon as a result of deliberation."

5. The Determining Tendencies of Will

Whereas ideas may be united in judgments and inferences, the essential oneness or lack of composition of the will-act remains constant. Moreover, the movements of intellect can continue from conclusion to conclusion; whereas those of will are brought to a term by possession of the good after which it is striving. The only thing that may be said to undergo some change is the object of volition; and even here, it is not so much a question of alteration in the nature of the object as in its external *locus,* so to speak: its closer approach to will, as a result of the latter's determining tendency to follow the means that conduce to its possession. Such a tendency does not imply that will is not free in its choice; but simply that, once having fixed on a course of action, it exhibits *a persistent striving to achieve its goal.* The striving may be unconscious; but its presence is effective, nevertheless. I decide to go downtown. Once the decision is reached, there is no more thinking about it, or debating the pros and cons of it. Rather, my whole preoccupation now is with the means by which I shall attain my objective. Yet all the while, the original resolution is exerting an influence on each intermediate step involved in reaching the goal.

Another example of the same phenomenon occurs under hypnosis. A subject is instructed to multiply certain numbers. On awaken-

ing he is presented with a set of figures, let us say 5 and 7; and he immediately responds with the answer 35. Most interesting is the fact that he can give no reason why he multiplied the numbers. Obviously, the hypnotized will, in accepting the task, produced a determining tendency that endured until the subject awakened, and guaranteed the fulfillment of what was demanded of him. The case is similar with the polyglot who can leave off one tongue and begin speaking in another at a simple signal. The appropriate words come, and the correct grammatical rules are followed, with what appears to be a wholly unconscious effort. The musician exhibits the same determining tendencies when he plays or sings an entire piece in a particular key, having accepted his task by a single initial glance at the scale in which the composition is written.

Narziss Ach, to whom we are indebted for the first thorough study of this special aspect of the will-act, insists that determining tendencies are among the most important factors in our daily lives. Thus, we are constantly setting out on certain courses of action, taking the necessary steps and precautions for carrying out our resolution; and all the while the goal towards which our steps are directed is either only vaguely present on the margins of consciousness, or else entirely forgotten for the time being. The significant thing about the observations of Ach is the way they confirm St. Thomas's notion of will as an appetite whose proper object is a reasonable good; and of the will-act as an inclination towards a goal—*good* and *goal* amounting, ultimately, to the same thing. In fact, the Angelic Doctor seems to have been clearly aware of the phenomenon that Ach was studying experimentally. To quote his own words: "Once will is fixed on a goal, it remains in that relation either actually [consciously] or by habit [unconsciously]; nor does it cease to be so attached until a special act—or at least a general movement of dissent—intervenes to break off the relation."

6. Experimental Studies

I. THE WILL-ACT

Ach arranged a series of experiments that were designed to elicit the will-act by the fruitful method of presenting obstacles. He made his subjects learn pairs of syllables, and then asked them to recite the first syllable of each pair but not the second. In the place

when the two liquids were equally attractive or nonattractive to taste. Here, as in the tests of Michotte and Prüm, the subject sometimes made his choice simply because he felt an obligation to finish the experiment. But in other cases, where no motive could be found, a final settlement was reached by naked self-determination, that is, through the interjection of the ego between two otherwise irresolvable alternatives.

II. MEASURING STRENGTH OF WILL

Since an essential part of his experiment was placing an obstacle in the way to the realization of a goal, it occurred to Ach that he might have a tool for measuring strength of will. If we consult his records once more, we find that some subjects did not bother to fulfill their resolve to substitute new syllables for the ones already learned, but abandoned themselves wholly to the impressions created by the experimental procedure and to the memory associations awakened by it. Others, on the contrary, were able to sustain their resolution in consciousness—even when it was comparatively weak—and so suppress any associative phenomena that tended to arise. But as Lindworsky points out, this sort of technique really does not measure the strength of will, but only the relative psychological force of two tendencies of consciousness: one from volition, and carrying the subject towards the goal which he has set up; the other from association, and expressing itself in the perseverative tendencies of memory.

Otto Selz attacked the problem from another angle, by asking his subjects to make a choice between painful and pleasurable stimuli. Those who accepted the former were thought to have stronger wills than those who preferred the latter. But is this true? The impression of a stronger will at play is often given in the outer movements that go along with the bearing of pain: for example, in the twitching of muscles, tensions, tears, and so forth. However, as we pointed out before, behavior of this sort does not enter into the will-act itself and may even conceivably be produced apart from the endurance of pain. Of course, the continued application of unpleasant stimuli may eventually cause us to waver in our resolve to bear with our troubles, so that the will finally succumbs. On the other hand, it is also possible that our decision to put up with them should be made all the stronger by focussing our attention on mo-

tives that favor sacrifice. All of which leads to the conclusion that will is not strong or weak in the sense that one's arms or legs are strong or weak. Comparing its action to the stroke of a hammer (a favorite analogy with some of the psychologists) is wrong. If a mechanical example must be employed, then, as Lindworsky says, it would be better to use the illustration of closing a switch which, in one case, lights a lamp; and in another, explodes a mountain to its base. The only proper way of referring to strength of will, therefore, is in terms of the *motives* that cause it to decide. Thus, the more numerous the reasons for doing a thing, and the more convinced we are of the value of our goal, the likelier it is that we shall cling to our resolutions. This is particularly true of the moral ideals that motivate our conduct. An account of this kind would explain, first, why some individuals are strong-willed in some respects, but weak in others; and secondly, why strength of will is not reserved to any particular age or sex, but may reveal itself in the most unexpected quarters.

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Chapter 27
ATTENTION

Since mind and will are properties of one and the same subject, it is natural that they should work together, and so bring into being certain commonly shared effects that are of capital interest to the psychologist. These manifolds of our intellectual and volitional powers can be considered from two points of view; the first operational, manifesting themselves in the phenomena of *attention*, *association*, and human or rationally-controlled *action;* the second dispositional, wherein mind and will, and all the powers subject to their influence, are perfected by the gradual development of *habits*. *personality*, and *character*. The remainder of our scientific treatment of human nature will deal with these six problems, with a final chapter on our human *faculties* which will be largely in the nature of a summary of all that has gone before.

1. The Meaning of Attention

In discussing the idea of attention, we are talking about a mental datum of such ordinary occurrence that every one has at least a practical notion of it. As a scientific concept, it means *the directing of our cognitive powers towards an object, with a view to knowing its qualities, or understanding its nature.* Mere awareness is not enough. A change from the state of passive reception of stimuli to one of active recognition of what is going on in the senses and intellect, is necessary to the attending process. Thus, by the vital and realistic use of our powers of knowledge, certain aspects and relations which were given in the original impression of things, are now seen in a new light; and qualities that might have escaped the

casual glance are transfixed, so to say, and lifted up into a region of clarity where they can be examined in detail. In this way, attention has much the same rôle to play in our conscious lives as the microscope in the hands of a scientist. In both cases, the focus is on some particular item that we are interested in, enabling us to discover the finer points of its structure, and so to achieve that synthesis of separate elements which makes for true comprehension.

2. *Abstraction*

The proverbial absent-mindedness of learned men is really a sign of their superior powers of attention which are able to concentrate so strongly on one line of thought that other matters are seemingly neglected. It is the kind of phenomenon which, in modern psychology, goes under the name of *abstraction*. Since the attending process not only brings the observer into the presence of a fact, but also arouses a mental set that shuts out other facts as irrelevant, it is plain that attention and abstraction (in the modern sense) are correlative movements. A number of experiments have been devised to show how abstraction works. For example, a subject is told to note only the taste qualities of a liquid; or only the right angles in a complicated mathematical figure; or only the reds in a series of prismatic colors. The selection of certain parts of the stimulus field, in such cases, and their separate consideration, is known as *positive abstraction*. The voluntary disregard of other parts, or the refusal to allow attention to dwell on them, is called *negative abstraction*. The latter, of course, is due to a special suppressive act of will. The subject who abstracts, moreover, is perfectly aware that his detachment of one item from a wealth of other items is a purely mental procedure, and that what he is concentrating on is only part of a whole field of observation.

St. Thomas was familiar with abstraction, in this modern meaning of the word. He refers to it as "a mode of simple and absolute consideration, as when we understand one thing without giving our attention to another. . . . for instance, when we regard only the color or some other quality of an apple and do not consider the nature of the apple itself." This kind of abstraction is the task of *possible intellect*, since it involves the actual understanding of what color is; or, in the example cited by Aquinas, the formation of an idea of color without forming any idea of the apple that is

colored. But we also have an abstractive process that is proper to *active intellect,* as we saw in a preceding chapter. Thus, to continue with the Angelic Doctor: "Those factors that enter into and constitute the essence of a corporeal thing—a stone, for example, or a horse, or a man—can be mentally separated from the individual principles that do not belong to the essence. This is what we do when we abstract the universal from the particular, or the idea from the phantasms [in which it is potentially contained]—where, in fine, we consider the nude nature of the thing apart from its individuating notes, as these are represented in the phantasms." Abstraction, then, in the accounts given of it by most of the modern psychologists, presupposes that act of the mind which derives the universal from the particular.

3. *Kinds of Attention*

While it is possible to speak of an attending process at a purely sensitive level, it is of no particular interest in our present discussion. For, once reason and will have unfolded, attention becomes a matter of intellectual consciousness, though it involves the use of the senses in the same way as thinking itself depends upon the movements of our lower cognitive powers. The important distinction between the various forms of attention, therefore, is that based on the presence or absence of will control. Thus *voluntary attention,* as the name implies, is deliberate. It does not proceed from will, to be sure, since the latter is not concerned with knowing; but it is "activated by will," as St. Thomas says, inasmuch as the cognitive powers are applied to their task of focussing, by a special act of volition. *Involuntary attention,* on the other hand, does not mean that the process of attending is not intellectual, but simply that the mind has no particular purpose in its focus; or that it is selective solely because of the attractiveness of the object which it is considering. We know, for example, that some things are so interesting that no special effort of will is needed to keep our attention riveted on them. To repeat what we have already said: attention, as described by the modern psychologist, is essentially a cognitive act wherein mind and sense are brought to bear on some particular aspect of an object, fact, or situation, thus detaching it for examination out of a total background of experiences.

4. *The Attributes of Attention*

I. SCOPE

There are limits to the range of consciousness; and even within these boundaries, the contents of experience that here and now occupy our attention are much more narrow than we suspect. Experiments show that the scope of the attending process varies widely from individual to individual, and even with the same individual from one period to another. Although several measurements have been attempted, no satisfactory method has been found for giving us precise information on the scope of our powers of attention. A relative standard may be obtained if the subject is assigned a task that can be fulfilled only by concentration, but which is short enough to exclude wandering and wool-gathering. If the problem is extended to include several degrees of difficulty, and then applied to groups, it is possible to get some idea of the average attention span. Studied in this way, experimenters have found that an adult of average ability is able to recognize 4 to 6 unconnected items at the same time; while a child of twelve can identify only 3 or 4. On the other hand, if a number of partial contents are linked into wholes, for example, the number of living objects in a landscape scene, or the number of diamond-shaped figures in a puzzle, an unusually large number of these partials can be simultaneously attended.

The results here follow a general tendency of mind, observed by St. Thomas when he says: "Intellect is able to know several things at the same time, provided they are somehow joined together and understood as one. But it is not able to grasp many things [simultaneously] under the aspect of their manifoldness." And again: "Partials can be known in two ways: first, in a vague manner, when they are all assembled into a single pattern—in which case they are recognized as sharing in the form of the whole, and so are grasped together; secondly, in a clear manner, when they are examined one by one, each according to its own species [or nature]—in which case they are not known together." Thus, what we gain by embracing numerous details within a given experience, is counterbalanced by our failure to exhaust the meaning of any one detail. This is a particularly interesting observation from the Angelic Doctor, since

he himself seems to have been able to occupy his mind, at relatively the same time, with several different subject matters.

II. INTENSITY

It is the general impression that the strength of our powers of concentration vary in proportion to the amount of field over which they are exercised. This view is correct, in the main, and confirmed by experiment. Yet here, as in the case of the outer behavior that accompanies a will-act, we must be on our guard against admitting sensations of strain, muscular attitudes, tensions of body, and so forth, as criteria of the intensity of mental focus. Theoretically speaking, the safest clue to the strength of attention ought to be the clearness with which we apprehend the thing under consideration; but this is a sliding rule, since the degree of insight that one can have about a fact or situation, depends on the native power of understanding—which differs from one person to another. A more practical technique has therefore been tried, which yields indirect results from a performance that requires attention. While the subject is busily engaged on some problem, certain stimuli are introduced that have only a threshold value for his consciousness, yet are in the nature of distractions. For example, a radio may be turned on, first just loudly enough to be heard, then with gradually magnified volume, as the experiment goes on. The results show that before an outside stimulus of this sort can enter the limen of consciousness, its strength must be increased as attention grows deeper. All this, of course, simply bears out our ordinary experience: that not every extraneous factor is a disturbing influence on our efforts at concentrating. On the contrary! It is possible to become accustomed to such dissipating forces; or when their presence cannot be denied, to devote more effort to the work that engages us. Thus, at the two extremes of our mental lives—the deep brown study of the seasoned thinker; and the complete repose of the dreamless sleeper—we seem able to habituate ourselves to any number of sensory stimuli that, in the beginning, have the power of upsetting our minds or keeping us awake.

III. FLUCTUATION

If a *subject* is asked to persist in attending to a given content of consciousness, one of the first things he notes is that the process is

not continuous. The fact is, fluctuation is the rule, not the exception, making it necessary to come back again and again to the object that we are considering. Hence, when we concentrate on very weak stimuli, such as substances with slight odors, we find that our sensations of them disappear at regular intervals. The same thing is noticed when we are listening to the ticking of a clock at a great distance: while we know its movements are regular, there are moments when we do not perceive them. It is a matter of debate whether these fluctuations of consciousness are peripheral or central in origin. They may be accounted for, physiologically, by variations in the flow of blood to the cortical areas, weakness in the organs of sense, and so forth; or psychologically, by lack of interest, or the presence of some inherent quality in our cognitive powers that makes it impossible for them to rivet attention on the same object for an indefinite length of time. The last-named factor would appear to be at the root of the problem, since even with the most favorable conditions of body and mind, it still is not possible to give absolute and undivided attention to the same content of consciousness, except for short periods at a time. To attempt an escape of this general law is to end by focussing on the effort to concentrate, rather than on the object of concentration.

Turning now to the *object* itself, it has been observed that the greater number of parts it possesses, the longer it will attract our attention. Even the child's interest may be prolonged when the toy he is playing with is a complicated bit of mechanism that can be examined piece by piece. On the other hand, it demands mental maturity and determination to fix consciousness on an object whose sole claim to attention is the abundance of imagery that it suggests; or the history connected with it; or the reverence with which it has been treated by others; or some other reason that is extrinsic to the object itself.

Finally, there is the problem of the *rapidity* of fluctuation. At first it was thought to be very high. But laboratory tests have revealed that the figure cannot be less than a third of a second; and the likelihood is that, under conditions of conscious effort to concentrate, the actual rate is considerably lower. A different problem, though not unrelated, is the speed and alertness with which attention may be shifted from one object to another. By testing out a group of students with memory materials, it was discovered that,

other things being equal, those who retained the most were those whose attentive powers were most rapidly adaptable to new data. But the ability to make quick adaptations, in such cases, is not due entirely to keenness of focussing power. Skill in making proper associations also has a part to play in the process. Thus, certain patterns of imagery are needed both for the accurate survey of a given task and for masterful handling of the materials to be learned; and the quicker memorial links are formed, the sooner one's attention can be turned into other channels.

5. *Circumstantial Features of Attention*

The scientist has made a study of certain factors that do not enter into the attending process itself, yet are connected with it in an intimate way. Some of these go before attention; others accompany it; others are results of it.

I. ANTECEDENT PHENOMENA

From the point of view of *object attended,* several factors of advantage have been brought forward by Robert Woodworth. First, *change* from a stimulus to which we have become accustomed to a new one, or from one intensity of the same stimulus to another, is calculated to rouse our interest. The steady ticking of a clock may go unnoticed until it stops; just as one who speaks in a low monotone is apt to have a listless and inattentive audience until he begins to shout. In much the same way, the startling drum strokes in Haydn's *Surprise Symphony* are popularly believed to have been inserted to stimulate the attention of drowsing dowagers. Secondly, *repetition* often enables a stimulus to enter the field of consciousness when a single impression would have no effect. Thus, a moan or a stifled cry may not penetrate at first; but if it is continued long enough, it will eventually cause us to take note and investigate its source. On the other hand, we may grow so habituated to the constant impinging of a stimulus that we lose all active interest in it. Thirdly, the *striking quality* of an object, for example, a brilliant color, a very high note, an itch, tickle, sting, pain, or other rough sort of skin sensation, may suffice to attract our notice. Fourthly, *definiteness of form* is also a reason for observing things in a particular way; so that it is easy to see how an object that is sharply outlined against its background should draw our attention.

ological reactions that go along with it. In fact, we seem to be aware of such things only when they are disturbing or inhibiting our attending processes.

III. CONSEQUENT PHENOMENA

One curious outcome of our effort to concentrate is the strengthening effect it has on weak sensations. A good example is the increased pleasure that ordinary foods yield when we stop to dwell consciously on their various flavors. The case is somewhat different with strong sensations, where organs become saturated and so lose their keenness of response, having only a limited amount of energy that they can expend on an object. Thus, while we may be acutely aware of a stimulus because of its original strength, any increase in intensity, especially in its higher degrees, is apt to pass unnoticed. Another effect, of a quite different character, is the weakening of affective consciousness by concentrating on our feelings and emotions. For example, anger is dissipated, rather than increased, by the process of introspecting it; that is, by giving our attention to the appetitive event itself, rather than to the object that causes it. Under analysis, it seems to vanish and lose its meaning. The reason is easy to discern, since appetite needs the incentive of knowledge, not only to set it in movement, but also to keep it continuously responding.

6. *Theories of Attention*

Several attempts have been made to explain attention in a scientific way, but there is little agreement as to how the process should be interpreted. Let us glance briefly at the main accounts.

The *inhibition theory* of Wilhelm Wundt proposes the idea that attention is simply a matter of repressing all conscious contents except those to which we are actually attending. This inhibiting effect is brought about by a special apperceptive center in the cortex. The obvious difficulty about the theory is its failure to tell us why some things are repressed in the way Wundt describes, and others not. Moreover, the existence of a special center in the brain that functions selectively, is a pure assumption.

The *reinforcement theory* of Ernst Mach accounts for attention in terms of the predisposing acts of the sense organs. From what we have said about such antecedent phenomena, it is plain that an

explanation of this kind does not touch the core of the problem—though a normal and well-rounded operation of our lower powers, as St. Thomas insists, is an excellent preliminary condition for the work of both intelligence and will.

The *motor theory* of Théodule Ribot, in contrast to Mach's account, makes the attending process to consist in a series of concomitant sensory acts. Thus, certain kinds of sensations are necessary before attention is aroused. When these are uniformly distributed throughout the level of consciousness, attention is increased. When they disappear, attention is no longer possible. But as the critics point out, it is hard to see how any given mental content on which we are focussing can be sustained and strengthened by our awareness of muscular movements, stresses and strains, and the other body sensations that accompany the act of attending. As we pointed out before, consciousness of such things is more a distraction than an aid to an attentive attitude of mind.

The *centro-sensory theory* of Georg Müller holds that when attention is fixed on a given datum, the previous percept of this datum is revived in the form of an image. The process, then, is a sort of retroactive movement in which further perception of the datum is correlated with a revived image of it; and in this way the intensity of the impression is increased, bringing about a proportionate intensity of focus or concentration. Now, that such a thing happens, when attention is focussed on palpable objects, is beyond doubt; but the range of our attending powers extends much further than this, and in many cases is exercised on things that are entirely impalpable. Besides, perception and imagery are products of sense; and the work of the senses is done when they have properly synthesized their data and prepared them for the abstractive process—thus setting up the conditions for the attending movements of intellect.

The *facilitation theory* of Hermann Ebbinghaus is based on the idea that repeated stimulation of the same areas in the cortex makes it easy for us to attend to the same object. Nerve impulses are thus restricted within certain bounds, with the result that our awareness of the object becomes clearer and more detailed. Again, all this may be true up to a point, though its implicit assumption that attention is essentially a matter of practise in using the same neural pathways is not justified, either by the facts on which the

theory is founded, or by general experience. It is possible to rivet our consciousness on a weak stimulus, or to think about a fact that we have seldom reflected on, and so raise it to a high degree of clarity.

The *genetic theory* of Johannes Lindworsky explains attention as the outcome of the co-operative movements of will and the cognitive faculties. This is the best account, to date, from scientific quarters; and it is in direct line with the teaching of St. Thomas and the traditional psychologists. According to Lindworsky, the true understanding of the process of attention demands that we properly grasp the total background of activity out of which it grows. The child becomes interested in some physical object; and his reaction is to concentrate his sense powers on it. His goal, of course, is possession; and quite naturally, he develops a way of using his end organs and a general type of behavior that is calculated to give him full information regarding the thing that attracts him. Improvement comes with practise and the maturation of his faculties, until in the end he has laid up a set of habits that are highly advantageous to the process of attending. Concentration, in fact, can now become a natural and spontaneous affair; yet, as we trace its history backwards in the life of the child, we find that it has grown out of conduct which had its primitive roots in a will-act. With the consciously voluntary form of attention, of course, there is no difficulty at all, since it is the outcome of a movement of will, commanding and controlling the cognitive powers.

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Chapter 28

ASSOCIATION AND PRODUCTIVE THINKING

1. Association and the Will-Act

Association, in a broad way, means the establishment of relationships between the contents of consciousness. At the sensitive level, the process is chiefly a matter of linking together images. But it is also a natural tendency of mind to create a bond between its ideas; and the trend of its associative patterns follows that of the images from which it abstracts its ideas. Thus, with intellect, as with sense, we discover that the laws of likeness, contrast, and nearness have a capital rôle to play in the development of habits of knowledge. Now, while such tendencies belong to the very nature of both mind and the re-presentative senses, they can be directed by insight and made subject to the command of will. Aristotle's laws of recollection are really laws of dianoetic memory; that is to say, of a power which works under the influence of the higher intellectual faculties. With how much more reason, therefore, is mind able to direct its own associative processes and to be controlled in its movements by an act of volition! In the present problem, we shall try to find out what relation exists between the association of images and ideas, on the one side; and the behavior of will, on the other.

2. Free Movements of Images and Ideas

Experience tells us that changes are constantly taking place in consciousness, as images and ideas come and go in spontaneous fashion. When the forces behind these natural movements are looked into, a number of organic factors are found that may help to account for them. Body needs and body fatigues, for example,

surely have something to do with the manner in which our minds and senses are employed. More particularly, irregular breathing and sluggishness of circulation, especially in the ebb and flow of blood through the brain, may actually bring about short stoppages in the regular streaming of consciousness. And even though such momentary "dead spots" go unnoticed, they may have the effect of changing the trend of our images and ideas. But whatever the cause, the fact is that these latter are in a more or less permanent state of flux; and except by a special act of will, we do not hold fast to them.

Let us suppose that we feel the need of new scenery. We wander out for a stroll in the streets, or more preferably, along some quiet lane in the countryside. The changing panorama completely fills our mind; and we are content to be passive towards the myriad impressions that are made on the senses. Then a particular object rouses our interest—a cottage lying off the beaten track; a slope of rising hill; a clump of trees—and at once we begin to surround it with pictures drawn from the memory of some previous experience. Here we have the starting point of a whole constellation of images and ideas that may carry us to a goal that does not even remotely resemble the beginning of the process. Yet, if we are able to trace it back, a thread of interest will always be found that explains the route we have followed in our associations. It is all so natural that no special will-act is needed to account for the continued interest; or if such an act is present, it is always of the unreflective type.

Sometimes, however, the smooth and spontaneous flow of associations is broken across by the deliberate recall of an unrelated image or idea; in which case, and for the time being at any rate, our reveries are cut short by the voluntary enforcement of the new problem on our reflections. Of course, if the materials on which a given train of thought and imagery is occupied are of the trivial sort and not strong enough to hold their appeal, then no special act of volition is required to turn our attention to other things. The drift of consciousness changes as soon as fresher and more attractive mental contents put in their appearance.

3. *Controlled Movements of Images*

No introspective skill is needed to reveal the fact that the movements of imagination and memory may be guided by a task. The steps involved in the accomplishment of a deliberate design have been studied at length by Otto Selz. Here we are considering only the rôle of imagery in the execution of the task. First, there is the setting up of the goal, which is pictured in a concrete way and so represented that it can act as an anticipatory scheme of what is to follow. Next, the means are explored imaginatively in terms of their usefulness to the attainment of the goal. Various tentatives are looked into, but only those that have a bearing on the fulfillment of the task are selected for serious consideration. Lastly, the images are worked over and fitted, if possible, into the original scheme. This process of sifting is the most critical stage of the process, since it implies that final choice will depend on the real apprehended relation between what is here and now pictured, and the goal towards which we are striving. If no such relation exists, then we must either try to hang our images on some other part of the general framework; or else begin the work of research all over again.

This is a rather technical description of the way we manage our imagery and point it to a goal; but it can be illustrated by a simple example. We want a favor from a certain individual. The goal is established in imagination; and our first concern is a consideration of possible ways and means. These, too, are pictured in an imaginative way. A number of avenues of approach suggest themselves: a personal visit; a phone call; a letter; or the intermediation of mutual friends. The route may turn out to be rather circuitous and involve several factors that were not imagined at the start. But no matter how far afield we seem to be going, the proper technique will be finally indicated by reference to our first intention. In the end, we are able to execute our plan and secure the desired favor. The procedure is also an excellent illustration of St. Thomas's idea of the intending process as "a basic movement of will towards a goal, presupposing an act of reason which sets in order the proper means for arriving at it."

4. Productive Thinking

The same principles are employed in productive thinking as in the controlled movements of images. Thus, the first task of the thinker is the establishment of a goal or the creation of an anticipatory scheme that will serve as a frame of reference for the exploration of means. A careful search for appropriate ideas follows, with trial and error movements on the intellectual level, the elimination of useless material, and choice of what is best suited to our purpose. Finally, there is the actual filling out of the original outline. Selz, who made a special study of the procedure, lists four possible ways in which productiveness may be achieved.

First, *both goal and means may be clearly recognized;* so that all one further needs to know is how to co-ordinate them properly. For example, we have before us the task of multiplying a set of large numbers. Several ways of attacking the problem present themselves. We consider them, one by one, before settling down to our job. The best solution is finally fixed on when we decide to use a logarithmic mode of calculation.

Secondly, *the goal may be known but the means not yet recognized.* An active search is started and the laws of association called into play. Unrelated groups of ideas likely will be forthcoming, each of which must be tested out as to fitness, practicality, and so on. Here the power of insight and of rational inventiveness is brought to bear on the problem. For instance, we are looking for a tool that will act as a tongs. A pair of shears is the only thing available; and at first glance they seem useless. On second thought, however, we reflect that when held horizontally, shears may serve to grasp and hold things. So we use them to attain our goal. The ability to reason, to be sure, often frees us from the domination of immediate and obvious associations, although the conclusions that we draw may depend, in some measure, on associative conditions. Thus, the grasping and holding properties of the tongs led us to consider how these same properties might be associated with some other object.

Thirdly, *with a goal in mind but no means devised,* and with past experience failing to supply us with helpful suggestions, *we may be favored by the element of chance.* It is presumed that there is a firm will to complete the task which faces us. A disposi-

tion of this sort produces a mental set that is conducive to the discovery of appropriate media and to the recognition of accidental findings as possibly connected in some way with our goal. The work of the inventor or research worker is a good example of this kind of productive thought.

Fourthly, *both goal and means may be the result of chance;* in which case no special effort is demanded to carry through our task. Primitive man, for example, tried to form a clay vessel in a plaited basket; and the basket left imprints of a pleasantly ornamental character. Even if he had deliberately striven for such an effect, he could hardly have done better under the circumstances. Of course, a case like this is a genuine illustration of productive thinking only on condition that the discovery is recognized as a possible goal for future work. Insight, and the determination to take advantage of chance happenings, are essentially implied even in the rude progress of early man.

From this analysis of the chief forms of productive thinking—both goal and means in mind; goal in mind, but not means; goal in mind, but means given by chance; both goal and means given by chance—it is obvious that will has a basic function to perform. Without it, our creative efforts would lack the vital force that is able to start and bring to a halt, direct, and arrange the various movements implied in the achievement of a rational goal through rational means. We might just as well expect to get a Shakesperian drama out of a medley of nonsense syllables; or one of Schubert's symphonies from a conglomeration of unrelated sounds. Perhaps the matter can be best summed by saying, with Johannes Lindworsky, that productive thinking means not only a goal of thought, but also and just as essentially a goal of volition.

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Chapter 29
HUMAN ACTION

1. The Meaning of Human Behavior

Appetite, whetted by knowledge, "is the cause of movement," according to Aristotle. In fact, without the impulsions that come from the appetitive powers, nothing would be done. Ideas, in themselves, are simply perfections of mind. To bring about action, they must be sown in the bosom of will. The total range of our behavior is very large; but it becomes *human* behavior only when it is informed by insight and volition. This means that our thoughts and will-acts are not isolated affairs, but tend to permeate into every department of our lives, giving a special aspect to phenomena that otherwise would not be different from the behavior of plants and animals. By using our minds and wills, it is possible to create permanent dispositions that influence all our outer movements. This is so true that we often judge a person solely from the standpoint of his objective conduct, or by his manifest way of doing things. We note his handwriting, for example, and say that it is weak or strong—meaning that his character somehow possesses these qualities. His manner of talking, or smiling, or wearing his hat, or waving a greeting is consciously or unconsciously taken as a sign of his attitude towards others or his outlook on reality. The way he walks, or holds himself, or grasps his pencil, or lights a cigarette may be very enlightening, too. Now, whether we are right or wrong in our judgment about a particular individual, the fact is that these gestures and external modes of behavior *can* have the imprint of his intellectual faculties upon them; and if a man is to be ultimately judged by his habits of mind and will, then his outward way of acting can offer a real clue to his motives and character.

Finally, there are the movements of our mental powers, working together and producing our *human acts,* so named because they cannot be shared by any other cosmic creature. As St. Thomas puts it: "These are the acts of which man is the master; and he is master of them precisely because they spring from his mind and will."

3. The Derivation of Outer Movements from Volition

The *ideomotor theory* dispenses with the will-act in the birth of controlled movements from the locomotive faculty. It is usually associated with the name of William James who gave it a prominent place in his psychology. According to the terms of his explanation, what we call volitional behavior is simply the outcome of the motor effects of the images and ideas that picture such behavior. Much the same point of view is found in the writings of Robert Woodworth, who holds that a naked idea of movement can start up the locomotor mechanisms and set the members of the body about their task of externalizing the idea. The theory of James and Woodworth, however, has never been experimentally demonstrated; and the findings of the laboratory do no more than confirm our ordinary experience: that images and ideas of movement tend to express themselves in some form of outer behavior. Moreover, this fact of common observation does not explain why we are able to consciously direct our locomotive faculty, give a rational pattern to its acts, and inhibit its course even in the presence of motor images and ideas. Hence some further power must be involved, whose rôle is to command, and whose effects are different from those of either imagination or mind.

Put very simply, there is only one way of explaining controlled outer behavior; and that is to make it *the product of an act of will.* Lindworsky has given an account of the matter which is very much like his genetic account of attention. The child comes into the world well fitted with a number of reflex and instinctive mechanisms that begin to function as soon as the right kind of stimuli present themselves. Feeding time and play time are particularly favorable occasions for the display of locomotor activities. Each movement that he executes leaves behind it an image which is cortically connected with the proper motor tracks that lead to and innervate the muscles involved. This process of association goes on in two directions: one from the movement to the image that is formed of it; the other from

the image back to the movement, thus making a complementary cycle. The image may be *kinesthetic* or muscular in the strict sense; that is to say, it may represent the correct position and movement of the different parts of the body in relation to one another. Or it may be simply an image of *seen* movement. In either case, it can become a goal of volition; and this is its most important aspect from the point of view of control. All that is now necessary to suppose is the gradual unfolding of will power in the child, so that he is able to produce an act of volition. Eventually he learns to choose the kind of behavior that he wants; and his deliberate turning to the pictures he has formed in his fancy, begins a transitional activity between the movement-as-imagined and the movement-as-executed. In this way he can apply the principle of control to both the natural or inherited types of behavior, and to those that have to be specially acquired.

The theory of Lindworsky gives a satisfactory account of two facts of common experience: first, why new motor responses, at any age in life, are learned only through a process of repetition which allows for the forming of functional bonds between the cortical centers of imagery and movement; secondly, why voluntary movements are not learned—even with an adequate system of muscle, sinew, and nerve—until we have acquired the proper image of such movements, since the image is the necessary link between the act of will and the muscular behavior that follows from it.

4. The Rôle of Imagery in Controlled Behavior

When it is a question of carrying out a skilled action, the intricate movements of which have already been performed several times, it is better to keep the image of the goal well to the fore of consciousness rather than concentrate on the details of the movements involved. An expert tennis player, for example, does not focus on the various twists and turns of wrist and arm, the position of his feet, the angle of incline in his body, and so on, that are behind the accomplishment of his stroke. Rather, he simply pictures the spot where he wants to place the ball—and proceeds to hit it. In movements of this sort, all images of the intermediary steps by which the goal is reached have already been firmly associated by long practise; so that concentrating attention on them is apt to disturb their smooth development. In the same way, the recitation of something we have

learned by heart is best achieved by the recall of images and ideas in patterned series, rather than one by one. In fact, to direct attention on the individual words usually upsets our recital.

Now, all this does not mean that each visual and kinesthetic image which pictures the intervening movements by which we progress is unimportant, or that we can get along without it. On the contrary, it is like a link in a chain that connects us with our point of destination; or better, like a rung on a ladder that helps us mount to the goal that we want to reach. Further, if there is thorough familiarity with the images required for a certain movement, we find that they tend to appear again in consciousness as soon as the movement is repeated. This makes it possible for us to compare the repeated movement with our images of it, and to note any deviations from the original. Thus, our kinesthetic images will help us in making finer corrections of movements that are not often used; while our visual images will be of assistance in dealing with the coarser and regularly-occurring movements.

5. *Special Developments of Human Action*

Because he is a rational creature, man has a broader vision of reality than other animals. Along with his insights, go certain choices in the way he shall accomplish his designs or meet the situations of life. If one method fails, he can try another; so that while his mind is essentially a power of exploring things in an abstract way, it is also a tool for making concrete adaptations to new factors in his surroundings. Let us see some of these peculiarly human devices by which he sets about solving his problems.

I. DEFENSE REACTIONS

It is normal for all of us to want to avoid the unpleasant issues of life. If a person annoys us, we try to keep clear of him. If our environment is distasteful, we make an effort to change it. If our thoughts are depressing and the current of our feelings particularly low, either we take to our beds for the oblivion of sweet slumber; or else we engage in some occupation that is calculated to lift our minds and emotions out of the rut into which they have fallen. Now, in each case, we are simply raising a protective barrier against those kinds of experience from which there is a natural inclination to shrink. To be sure, one can develop an attitude of stoic indifference

towards such things; or better, bear with them in a spirit of Christian fortitude which teaches us to accept calmly the untoward circumstances of life, and even to suffer fools gladly. Yet, we should not be human, did we not sense an inner repugnance to the disagreeable features of our existence; and building up a bulwark against them is certainly in no way abnormal, even though it is not the most heroic manner of acting.

II. SUBSTITUTE REACTIONS

If an unsatisfactory situation cannot be avoided by cultivating a defense mechanism, it is still possible to make other natural adjustments. One of these is *compensation,* in which an undesirable trait is covered up or disguised by a desirable one; or, more generally, in which something we have loved and lost is replaced by another kind of value. In such cases, the goal is to find an equivalent for what we have been deprived of, a form of behavior which, by creating new interests, will substitute joy for pain, satisfaction for dissatisfaction, a feeling of success for a feeling of failure. Another common way of meeting unpleasant situations is by *sublimation* which, in the strict sense, means a deflecting of sex impulses to objects that have no special sex connotation; but more broadly, a directing of instinctive movements to levels of higher value, and especially to socially useful goals. Here the purpose of the psychic mechanism is to turn our thoughts and emotions into altruistic channels, by doing things that subserve the interests of others rather than ourselves, and by finding our pleasures in spiritualized forms of action, such as the works of religion. The change intended, of course, is always for the better; and if the sublimating process does not always achieve this end, the failure must be due either to our own unreasonableness about the means we are using, or to a lack of appreciation of the goal towards which we are bending our activities.

III. SOLUTION OF CONFLICTS

Because the urgings of instinct and the drives of our lower appetites are often at war with our mental and moral aspirations, it is necessary to modify or even to repress many of our natural desires. The struggle between reason and passion, on the inside, and between self and the whole world of non-self, on the outside, starts at a very early period in life. The child must learn

that he cannot have everything he wants. With the unfolding of mind and will, he further learns that many of the things that may be possessed in a physical way are morally unsatisfying. All along the line, there is a constant give and take, an assertion and relinquishment of rights, as the ideals of youth meet with counter currents. Control must be exercised if life's battles are to be successfully waged; and control means the development of habits that will moderate certain self-assertive tendencies, on the one hand; and encourage altruistic modes of behavior, on the other. It is only when will has developed to the point where it can dominate our urges and set a safe curb on our emotions, that victory is really assured.

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Chapter 30
HABIT

1. The Meaning of Habit

We are born with a generous array of powers, each of which, when properly exercised, represents a perfection of our nature. The very purpose of a power is to act. But this is not always easy, especially when it is a question of the full and unimpeded use of our sensitive and intellectual faculties. Here a certain amount of practise is entailed; and with practise comes the laying up of habits. According to St. Thomas, only when reason and will have had a hand in the matter can we speak of habit in the strict meaning of the word. Thus, there are natural dispositions in our vegetative powers and the outer senses, to act efficiently as soon as a stimulus is presented; but these are not true habits. The inner senses, the animal appetites, and locomotor power, on the other hand, can be influenced by insight and volition; and here, says St. Thomas, we have a real basis for habit which may be defined, in terms of his principles, as *a permanent quality, growing out of the exercise of mind and will, and inclining our powers to act in a prompt, easy, and pleasurable manner.* Let us look a little more closely at the elements of our definition.

I. PERMANENCE OF QUALITY

For Aquinas, as for Aristotle, "habit is something that can be changed only with difficulty." The Stagirite had remarked that "one swallow does not make a summer"; and St. Thomas re-echoes: "One drop of water does not hollow out a stone." So, too, of course, one act is not enough to produce a habit. On the other hand, what is long in the making should be long in the losing; and this is exactly

the case with habit. Its quality of permanence is the result of the plastic nature of the power that receives it. Not only is a trace left behind by the impression of an object; but the power is able to hold fast to such traces. What happens to it in the past is conserved in the present, and made to act as a pattern for the future. By degrees it takes on a lasting history, a sharp and deep etching which, as St. Thomas says, is not easily moved or eradicated. As a *quality,* more-over, habit means the adding of new forces to our productiveness. It has something in common with *power,* since it, too, is a principle of operation. Yet it differs from power because it is acquired, not given from the beginning. Last of all, it is distinct from *disposition* which is also a species of quality. The latter, as Aquinas tells us, is a tendency of matter, rather than of power; and so it is not as firm and abiding as habit. Health and beauty are examples of disposition; and it is tolerably easy to be deprived of both of them. They may be called habits in the broad sense of "something had"; but their nature is to be *entitative* and not *operational,* or to modify substance rather than the accidents of substance. Now, it is plain that the habits we are talking about here are concerned with our powers, which are accidents; and that they are essentially aimed at helping us to act.

II. DEVELOPMENT FROM REASON AND WILL

The ultimate basis of habit; as Aquinas insists, is in *the indeterminate nature of the human mind.* This is, without a doubt, the most critical point in his whole theory, since it is a manifest shifting of the problem to an intellectual level. Thus of all earthly creatures, only man can know things abstractly; that is, in a way that leaves him free from the contingencies of the here-and-now. For, as we have already learned, an idea is a representation of the essence of a thing; and this essence can be truly predicated of all individuals of the same class or species, without respect to time or place or accidental differences. Further, because man's thoughts can soar above the concrete and particular, his will is also able to choose or reject all goods that have the same concrete and particular characteristics. Now, it is this essential indetermination of his rational powers, this freedom from confinement to one way of thinking and willing, that makes habit possible, at the same time that it makes it indispensable. Thus mind and will, the true principles of habit in our

other powers, are themselves most desperately in need of these stabilizing qualities: mind, because of the vast fields of knowledge that are open to it, alluring it in all directions at once; and will, because of the wide range of virtues that offer themselves as goals of attainable perfection. The horizons of truth and goodness are so great, in fact, that unless our intellectual faculties are grooved to certain channels of operation, there is danger of their accomplishing nothing permanent and worthwhile. So that it is only after their own households have been suitably furnished, that they can enlarge on the sphere of their influence: first, by forming habits in the sensitive powers; then, to a lesser extent, by penetrating to the level of the vegetative faculties when these latter are made the object of a course of conditioning. All in all, it is a wide field to plow; and sowing the seed of habit in those fertile areas where it will grow, is enough to occupy a man for the best part of his life. The process, in fact, is limited only by the limitations of mind over matter; that is to say, by the degree of control that intellect and will are able to exercise over the cognitive, orectic, motor, and reflex properties of our nature.

III. PROMPTNESS, EASE, AND PLEASURE OF ACTION

Experience teaches us that there is always a strong inclination to repeat what we have become accustomed to doing. Thus, habits are roused to action at the first signal from their objects. This is especially the case when their roots have grown deeply, and when it takes a special act of will to prevent them from operating. Under such circumstances they are scarcely distinguishable from the powers that they inform; and St. Thomas refers to them as a kind of *second nature*. What was slow and painful at the start has now become graceful and easy. Indeed, it is hard to believe that there were periods of false steps and clumsiness, when we see the quiet assurance and mastery with which habits can be exercised: in the craftsman's use of tools; in the painter's handling of colors; in the writer's playing with the words; in the singer's smooth modulations of voice; in the thinker's clean-cut incision to the heart of a problem; in the saint's effortless practise of mortification. Finally, habits are a principle of pleasure to their possessor, since they allow for the fullest and most satisfying use of his powers. From this point of view, they may be likened to good servants, waiting at attention for a sign from

their master, ready to lend a hand in lightening his burdens, making his work not only more readily undertaken and more thoroughly accomplished, but also a source of greater freedom and joy.

2. *The Basis of Habit*

On its *physiological* side, habit has the same organic context as the power that it perfects; and every power, as we know, is either directly or indirectly dependent on the normal and healthy functioning of the body. In particular, habit is conditioned by the movements of nerve impulses, the regular use of selected pathways, the development of proper synaptic connections, and so forth. Close study of the last-named structures has shed considerable light on the mechanics of the habit-forming process—a somatic activity, let it be added, that must be presupposed even to the operation of mind and will. Thus, it is a characteristic of the synapse that it always offers resistance to the first passage of a nerve impulse. Once, however, a current has managed to cross the barrier, it lowers the resistance of the synapse to future crossings. If the connections between centers in the cortex have not been established by the inner growth of the nervous system, it is possible, within the limits demanded by habit, to establish these by training. From the organic point of view, therefore, learning to use one's powers with skill and readiness is correlated with the laying down of new tracks in the central nervous system, and ultimate elimination of obstacles at the synapses so that there is a smooth passageway for impulses. If a habit is disused, resistance at synaptic connections reappears; and the procedure must be gone through again. Two stages, then, are revealed in the physiological growth of habits: first, the acquiring of preferred routes of conduction for nerve currents; secondly, the strengthening of synaptic links so that the preferred routes may become permanent.

On its *psychological* side habit is explained as a phenomenon of revival. Thus, it is a matter of common observation that past movements of our powers, particularly those of very recent date, have a tendency to recur. Even if it is only a partial content that comes back, the power is inclined to repeat the whole experience, or to reproduce the complete pattern of acts with which it has now become familiar. The amount of revival actually achieved is dependent on the extent to which the associative tendencies of consciousness fit in

- Habits
  - somatic
    - vegetative powers
      - *conditioned reflexes*
        - borderline habits
  - psycho-somatic (compenetration of intellect and will)
    - outer senses
    - common sense
      - *control of use*
        - borderline habits
    - imagination
    - memory
      - *corresponding with intellectual habits* (in which images are always used)
    - cogitative sense
      - *sensitive prudence,* (corresponding with intellectual prudence)
    - concupiscible
      - *temperance*
    - irascible
      - *fortitude*
    - locomotor
      - *tongue skills*
      - *hand skills*
      - *foot skills*
        - plus manifolds
  - psychic
    - intellect
      - speculative
        - *understanding*
        - *knowledge*
        - *wisdom*
      - practical
        - *art*
        - *prudence*
          - point of transition between psychology and ethics, where first principles become last ends, and where will applies knowledge of intellect to concrete and singular actions
    - will
      - moral
        - *prudence*
        - *justice*
        - *temperance*
        - *fortitude*
          - in collaboration with sensitive appetites

truly mastered the habit. The fourth stage has given rise to some differences of opinion among the investigators. According to Harvey Carr, the final fixation of a habit is due to frequency of acts; recentness of their occurrence; and their intensity. John Watson contends that frequency and recentness are enough to account for success. Edward Thorndike holds that frequency of acts, and the pleasure with which they are performed, account for the final perfection of habit. In all cases, there is general agreement on the frequency factor, that is, on the need of *repetition*. This is also the point of view of Aquinas. But he has two observations to make that have a bearing on the matter. The first is the fact that certain habits are more easily developed by one person than by another. This may be due to the better texture of sense organs possessed by the one, or to the finer physiological complexion of his body in general. Under such circumstances, it is conceivable that habits should be acquired with a lesser frequency of acts. The second observation is concerned with the habit of first principles or understanding which does not depend on repetition, but is developed by intellect as soon as it becomes conscious of reality. This, to be sure, is the exception that proves the rule, since it is the nature of habit to demand repeated performances before it can be brought to perfection.

5. *The Strengthening and Weakening of Habit*

A habit grows stronger or weaker in proportion to the amount of use that is made of it. Our knowledge of a particular science, for example, is reinforced both objectively, when it extends to a larger number of facts, theories, and laws; and subjectively, when examination and re-examination of its content gives us deeper insight into its meaning. Strengthening is secured, therefore, in the same way as the habit is acquired: by repetition of its acts; by widening the range of its objects; by giving greater attention to detail, and so forth. Weakening, on the other hand, is the result of acts that are below the minimum of strength necessary to adequately exercise the habit. Such acts may fall so far below par, in fact, that the habit finally ceases to function. To repeat, then, and sum up with Aquinas: "If the intensity of an act is proportionate to the intensity of the habit, or goes beyond the latter, it either increases the habit, or disposes towards its increase. Thus, if it is allowable to make a comparison with growth of the body: not every morsel that is put

into the mouth makes for greater bulk; yet, the day-after-day ingestion of food has the ultimate effect of increasing the size of the body. . . . So, too, the repetition of acts causes habit to grow. On the other hand, should the act fail to measure up to the intensity of the habit, it not only leaves no disposition to increase, but even tends to the diminishment of the habit."

Can one habit strengthen or weaken another? The answer of St. Thomas is affirmative on both scores. In favor of reinforcement, he points to the fact that several habits may be formed in the same power, and mutual benefits be reaped from their existing side by side. Thus, we may be well versed in several branches of science or philosophy, one of which is calculated to strengthen our knowledge of another. In proof of debilitation, there is the experience of seeing our good habits slowly weakened and even wiped out altogether by the acts of opponent bad habits. The only exception to this rule is in the habit of understanding, already mentioned, since opposition to first principles is tantamount to a denial of the nature of the human mind. With conclusions from first principles, the case is different; because here we can find a false science that is opposed to true science. But the conflict between good and bad habits appears more frequently on the moral level, where reason and instinct are so often in basic disagreement. Yet for the appetites, as for imagination, memory, and estimative power which are natural principles of movement in the exercise of the passions, we have tools of control that can help us solve our problems by the elimination of undesirable traits.

6. *Theories of Habit*

It is interesting to compare the account of Aquinas with some of the explanations of habits given by modern psychologists.

I. BEHAVIORISTIC INTERPRETATION

The problem of habit is one of capital importance to the behaviorist. Watson devoted long and painstaking efforts to its study; and the fruits of his researches led him to conclude that habit, like instinct, is reducible to reflexes, systematized and functioning in serial order when the organism is confronted with certain stimuli. The only difference between habits and instincts, in fact, is in the manner of their origin: the latter being inborn; while the former are acquired

during the lifetime of the individual. All our human habits are comprised within three groups: the manual and pedal series, representing organization in trunk, arms, hands, legs, and feet; the visceral series, covering all forms of emotional response; and the laryngeal series, under which habits of thought and speech are included. The approach of the response psychologist to the problem of habit is much the same, except that he interprets it in terms of sensori-motor arcs, instead of reflexes. Theories of this sort may help to explain the somatic basis of the habit-forming process, but they fall far short of a complete account of its psychological phases. It is plain, moreover, that they seriously mistake the nature of our intellectual habits when they reduce these latter to manifestations of reflex activity or the completion of sensori-motor arcs.

II. PSYCHOANALYTIC INTERPRETATION

Freud, too, has a great deal to say about habit; and in line with the basic elements of his theory, he makes it a part of his larger concept of instinct. Thus, it is the outcome of a kind of repetition-compulsion; that is to say, of a feeling that we are obliged to go over certain experiences again and again. The procedure is particularly noticeable in the reproducing of past emotional tensions which seem to recur spontaneously, regardless of the pleasantness or unpleasantness that they bring in their train, or of the value that they may have for us individually. Here we have the same short-ranged view of the problem as was noted in the behaviorists; as well as the same failure to understand the meaning of habit for mind and will, which are the only true sources of control in the movements of instincts and appetites. Furthermore, according to the Freudian view, to be in possession of habits would seem to imply that all is not healthy and sound in our make-up, since they result from compulsions that are not normal.

III. HORMIC INTERPRETATION

Hormic psychology is interested in all the general tendencies of human nature, of which the urge to form habits is surely one of the most important. As McDougall explains it, there is a native inclination in our powers to repeat acts that have once been initiated; and with each rehearsal the performance becomes easier. This is part of the process by which they gradually unfold; and it

illustrates the overall pattern of purposiveness that is behind the movements of the organism. While there is nothing new in views of this sort, they lay stress on one point in the teaching of Aquinas, worthy of notice: that habit not only begins with nature, since it is born of a tendency which is sown in the power from the beginning; but it also ends with nature when it becomes so perfect and spontaneous that it cannot be distinguished from the latter. The goal of the habit, in such a case, is the same as the goal of human life itself; and this is the insight of McDougall and his school, that touches most closely on St. Thomas's analysis of habit.

7. *The Control of Habit*

I. CULTIVATION OF DESIRABLE HABITS

It is impossible to overestimate the value of correct methods in the formation of habit. William James has explained his views of the matter at some length; and we briefly summarize his suggestions for a scientific and effectual manner of handling the problem. First, the task of developing the habit must be set about, not with halfway measures, but with as strong an initiative as possible. This means that we deliberately put ourselves in circumstances that are favorable to the growth of the habit. Once we have gathered momentum in our efforts, the danger of backsliding or breaking down becomes remote. Secondly, we must allow no exceptions to occur in our practise until the habit has planted its roots deeply and securely in the power that it informs. Thus, training must be constant and carefully supervised if we are to progress in a satisfactory manner. Thirdly, every occasion should be taken to exercise the habit, even when there is no particular purpose behind our action except the sheer pleasure that comes from doing things well and easily. Repetition, of course, is essential to the process; and there is no other road to perfection. As Aristotle says: "One becomes a builder only by building; and a lyre-player only by playing the lyre." The reason is plain, since the inclination to act in habitual fashion becomes ingrained in proportion to the frequency with which such acts occur.

II. ELIMINATION OF UNDESIRABLE HABITS

Robert Woodworth points out, very truly, that the mere will to unlearn an undesirable habit is not enough, at least in the ordinary run of cases. Some management is necessary. In the first place, we must be fully conscious of the distasteful nature of the habit; and this is not always easy since we are often inclined to overlook our own shortcomings. In the second place, once acquainted with what has to be stamped out, we must take active steps to form a counter habit. A method of this kind would meet with the instant approval of Aquinas who, as we have already seen, suggests that we strengthen the acts opposed to a habit, when we want to break down and eliminate the latter. It should be noted, however, that the undesirability of a habit does not always mean that it is morally bad. A slipshod memory, for example, a loose or careless knowledge of a science, a displeasing posture of body, and so on, are not things to be proud of, certainly; yet their presence need not imply any infraction of the moral law.

Knight Dunlap suggests an alternative line of behavior to that of Woodworth; working on the principle, also found in the teaching of St. Thomas, that not every act really strengthens a habit. Thus according to Dunlap, when we are thoroughly annoyed with some undesirable trait, the conscious and slow repetition of the acts that produced it may become the means of ridding ourselves of it. Again, there is no question here of anything that is morally objectionable. Suppose, for example, that we have the habit of always striking *hte* on the typewriter, instead of *the*. By deliberately committing the mistake several times, with constant focus on its distastefulness, it is possible that the error should eventually disappear. In fact, this result was achieved by Dunlap in an experiment. Another practical case, studied in his laboratory, was a subject with the habit of stammering. He was first asked to note precisely how he was using his vocal organs. Then Dunlap had him consciously reproduce the faulty manner of speech, analyzing his disturbance in detail and pointing out its particular rhythmic failures. Finally, the subject was encouraged to repeat all his inaccuracies, until they were as perfect as their first unpremeditated appearance. The results were highly favorable, and the defective habit was eventually eliminated. It should be added that this unusual method, which

appears to be worth a serious trial, has not been employed very widely. Its use would be limited, to be sure, since many cases of stammering are the result of much deeper psychological causes than the mere inability to control the movements of one's vocal organs.

8. *The Rôle of Habit in Mental Life*

At birth our activities are mostly of the reflex or vegetative type; but before many weeks have passed, the outlines of several habits may be detected. These acquired modes of response consist chiefly of co-ordinated movements of the head, trunk, limbs, and extremities; and of trial experience of the organs of sense. All this is fortunate and conducive to our well-being; for, as the psychologists point out, if our muscles and locomotor movements did not tend to take on the quality of habit, we should become exhausted even by our simplest operations. Once the body and its members have been taken care of, we can devote our attention to the development of the interior senses, all of which have significant tasks to perform in the perfecting of reason and will. Indeed, without them there could be no such thing as intellectual progress. Here the benefits are mutual; because, with the growth of insight and the deliberate use of the will-act, the work of the senses can be strengthened and systematized, and proper direction given to the movements of the lower appetites. Habits of knowledge begin to be formed; and with knowledge, comes the correlative task of training the will by habits of virtue. The process is unlimited and can go on to the end of our lives. The reward is ease and grace of action, all along the line of our cognitive, orectic, and motor powers—an action that may become so habitual, especially in its motor aspects, as to be almost indistinguishable from pure automatism. As James observes, pointing to this nonreflective aspect of so many of our outer movements: "Our dressing and undressing, our eating and drinking, our greetings and partings, our hat-raising and giving way for ladies to precede, nay, even most of the forms of our common speech, are things of a type so fixed as almost to be classed as reflex actions."

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Chapter 31
THE EGO

1. *The Notion of the Ego*

The study of self as an object of scientific observation has been somewhat overlooked by the psychologists until recent times. Perhaps one of the reasons for revival of interest in the fascinating subject is the work of the mental hygienists, like Freud and his followers, whose special ambition has been to investigate the abnormal side of human nature and devise suitable measures for its readjustment. The general orientation of modern psychology towards a personalistic point of view in the interpretation of its findings may be another reason. The wide interest that has developed in tests and measurements is also a contributing cause. Finally, and in an indirect way, the growth of psychosomatic medicine has undoubtedly had some influence in shaping the programs of research that now find a place in every well-organized laboratory. In any event, the problem of the ego, with all its ramifications and shades of meaning, can no longer be pushed into the background. We shall begin, therefore, with the assumption that there is such a thing as an ego, to which all our vegetative, sensitive and intellectual acts are referred. What it is, at bottom, we shall see in a moment; but we can define it here, in its phenomenal or scientific aspects, as *the individual's awareness of himself as a principle of action.*

2. *Distinctions of the Ego*

There are three meanings to the word *ego,* all necessary for a proper and full understanding of it.

I. THE PSYCHOLOGICAL EGO

The psychological ego stands for the integrated sum of all our powers, habits, and acts, knit together and organized in such a way

substance, and not accident; and that the substance in question has the power of thinking and willing. Person, in fine, is what the scientist is referring to when he speaks of the *pure ego*. It is also the thing that the man in the street is talking about when he says, in everyday speech: "I see"; or "I feel"; or "I know." Because the "I" in all these cases is not only the logical subject of each sentence, but also the ontological subject of each action, the substance from which it proceeds, the final reason for its existence as an action. The presence of such an ego, underlying everything we do, can no more be denied than the obvious truth of our own existence. Even our most inconsequential experiences that are now here and now gone, must belong to some substratum which neither comes nor goes but is continuously present from the moment we begin to live as human beings.

In the gradual unfolding of mind, however, the word *I* is first used by the child in the sense of personality, private or public: as a derivative from his contacts with the people and things in his environment. But with the development of his intellectual power, he learns to think about himself as an individual, separate from other individuals, and capable of producing actions that are properly his own. Now, what he is reflecting on here, in his still immature way, is more closely allied to the pure ego than to its exterior manifestations in personality and character. It is plain, then, that the pure or ontological ego forms the pith and core, or better, the root and base, of all other meanings of ego.

3. *Experience of the Ego*

I. SIMPLE OBSERVATION

The claim of certain psychologists that the ego is nothing more than a bundle of sensations, images, feelings, and so on, is opposed to both the facts of experience and the public witness of mankind in general. For no conscious datum, of the sensitive or intellectual order, ever appears within the field of awareness without carrying the impression that it is *mine:* that I am its possessor as well as originator; and that I am accordingly responsible for it. Memory tells me, moreover, that I am the same individual who lived ten, twenty, or thirty years ago; that while the phenomena of consciousness are in a constant state of flux, something underneath holds them

together, providing a secure and permanent foundation for the claim that they are mine. The scope of such phenomena extends all the way from simple perceptions to the highest and most complex forms of thought; from elemental feelings to decisions that may mean the difference between life and death to me. Yet, I am inwardly convinced, and without the need of argument, that each datum is only part of a unified pattern which is my complete personal history; that it cannot be traced to any principle outside of me; that it reveals itself, in fact, solely within the forum of my own concrete experience. This does not mean, however, that I do not arrive at the conception of my ego by a process of abstraction. Indeed, did I not have the power of reflection on what is passing in my consciousness, and of pushing the implications of my thoughts to their final conclusions, I should be unable to arrive at the notion of an ego at all, as an abiding substratum of all that goes on within me. In short, if I eliminate reason from the context of my history, past and present, I should continue to be an experiencing subject but not an ego—a state of affairs that obtains in the animal kingdom.

II. SCIENTIFIC OBSERVATION

Evidence of awareness of the ego may be brought forward from several scientific sources. William McDougall, for example, contends that knowledge of self as a continuously existing and identical reality "is founded upon our experiences of striving, of effort, of putting power or energy in the pursuit of our goals. One thinks of oneself as that which knows and strives, enjoys and suffers, remembers and expects." Charles Spearman attributes our notion of the ego to immediate experience. Discussing the problem in his work on intelligence, he states very bluntly that "any psychology of cognition that fails to account for this universal apprehending of an *ego* must be disfigured by a gap so wide and deep as to render it impotent to explain thoroughly the simplest event in either ordinary life or experimental procedure." The close connection between the act of choice and consciousness of self has also been established by several lines of research. Thus, Narziss Ach's "*I* really will" formula; Francis Aveling's "adoption by the Self . . . of the motive or motives for the selection of one of the alternatives"; McDougall's "supporting of a conation by the co-operation of an impulse, excited within the nervous system, of the self-regarding sentiment"; even

the indirect witness of Sigmund Freud's "super-ego," which bases selective behavior on respect for the customs of mankind, are all so many independent sources of testimony that converge on the concept of self, as exhibited in the activities of will. This remarkable agreement, coming from men with radically different outlooks in psychology, is one of the most impressive results that scientific investigation has to offer. It is all the more striking, in view of the manifest change of bearing or attitude that it represents—particularly when one compares it with the standpoint of men like David Hume, Herbert Spencer, Alexander Bain, and George Lewes, for whom self was little more than an association of the products of sense and sense appetites, capable of being dissolved when the association was dissolved.

4. *The Substantial Nature of the Pure Ego*

According to St. Thomas, intellect knows its existence from each act that it performs. The ontological ego, on the contrary, is not given in such movements of reflection. Both its existence and its nature are matters of inference, since it is not a principle of operation but of being: the ultimate principle, in fact, in which our acts, powers, and habits find their support and subject of inherence. Now, that which supports other things, but does not need to be supported itself, is a substance. The notion of substance, however, is developed only by degrees, as our minds come more closely in contact with reality around us. Thus, our experience of bodies leads us to postulate some kind of container in which the qualities that we perceive—color, taste, fragrance, weight, and so forth—are enclosed. Then, from considerations of this sort, we are gradually brought to see and accept the idea of a permanent foundation of all the attributes that we discover in ourselves; and so, in the end, we are forced to conclude that the psychological and moral ego are simply outward manifestations—through sensing, feeling, thinking, and willing—of a central ego which is not an accident, but the carrier of accidents; not operational, but the subject of operations; in short: of an ego that is ontological in nature. St. Thomas, as we have seen, speaks of it as a substance of a rational nature, since reason is its loftiest property. With reason comes freedom, which sets a new mark on the ego, making it sacred and inviolable. As a person, therefore, man is a creature apart; a thinker in his own name; a doer in

his own right. Now he can take himself in hand and create his own destiny: using or abusing his powers as he pleases, but always with the burden of responsibility for everything he does.

5. *Introspection of the Ego*

I. CROSS SECTION

An instantaneous view of consciousness reveals a wide complexity of elements. Leonard Troland has given us a good summary of what to expect at any given moment of introspection, when self is placed in a context of ordinary experience. A typical cross section reveals: first, recognition of the sensible qualities of objects, their colors, tones, odors, and so forth; secondly, special arrangements of these perceptions within a framework of time and space; thirdly, factors of subjective experience, such as feelings, memories, thoughts, decisions, awakened by the perceptions of sense; fourthly, the establishment of further relations among all the foregoing elements; fifthly, the changes that these added associations or relationships undergo. In making an analysis of this sort, however, it is well to remember that the varying aspects of consciousness can be studied in detail only as abstracts from one whole experience that is unified, at its base, by its roots in the ontological ego which is one.

II. LONG SECTION

The experience is quite different when we look at the contents of consciousness in the long section; that is to say, when we view them as a succession of events, within the frame of a temporal pattern. For, here we get the impression of flux, from one point in our history to another, and with any length of time that we want to fix for a measurement—a day, a year, or the span of a whole life. Self observation, both common and scientific, tells us that the stream of experience is always gliding along in continuous fashion. Moreover, since the fact of being aware of this or that datum is inseparably linked up with the ego which is its subject (*I* see, *I* feel, *I* think, and so forth), we must also be aware of the continuity of the ego from one moment to the next. This is particularly so in matters of remembering, where two facts are recalled that have no internal connection with each other, yet are appropriated as part of our own experience solely because we recognize the oneness of the present

self with the self that underwent these experiences in the past. The identification that we here make, to be sure, does not mean that we are actually aware of the substratum which is our person or ontological ego. That, as we pointed out before, is an inference which we can arrive at, if we want to; but which is ordinarily taken for granted as a fact of common sense.

An objection may arise, on physiological grounds, that the organism is always undergoing change, that matter is perpetually flowing in and out of it, and that the pure or ontological ego must surely be affected by such contingencies. The body, of course, is essential to our nature as human beings; so that if it be inconstant, how can person be constant? The difficulty was foreseen by St. Thomas who met and answered it with his usual clearness of distinction. Thus, if we consider the protoplasm in our make-up from the standpoint of matter alone, then, like all material things, it is subject to change, as represented by the anabolic and catabolic processes that are necessary for the storage and release of energy. But if we consider this same protoplasm from the point of view of its nature, then it always retains its original identity, since it is always a *specifically human body.*

6. Phenomenal Changes of the Ego

Apart from the permanent and substantial nature of the pure ego, there is abundant evidence to show that alterations may occur at its surface, and that several personalities or characters may exist, side by side, in the same individual. The explanation of such phenomena may be sought in partial or complete changes in the contents of consciousness, along with the growth of new habits and the weakening of old ones, which these changes at the conscious level imply.

I. PARTIAL CHANGES

All of us are more or less familiar with the continuity of our perceptions, and with the affective states that are brought about by knowledge. The regular experience of such continuity, together with our mental awareness of self and its unchanging identity, accounts for the fact that we do not "feel like different persons" with each new percept or idea. Yet, it is surprisingly easy to be transported into another world. Suppose that we are reading a gripping story, or looking at some sublime scene in nature, or probing the

depths of an abstruse problem. One can readily understand how an experience of this sort should thrust the usual contents of consciousness into the background. Under such altered conditions, we have the impression of being lifted out of our ordinary selves. The sense of change gathers strength when physiological factors are at work that modify our otherwise constant and normal reactions to our surround. Such temporary disturbances as buzzing in the ears, water in the auditory passages, dizziness, autointoxication, and so on, may lie at the roots of this notion of a changed ego. But whatever its causes, the fact remains that when the constant mass of our sensations, images, thoughts and feelings becomes unfamiliar, we seem to be somehow different from our ordinary selves.

II. TOTAL CHANGES

When conscious contents are completely altered, the personality or character of an individual takes on an aspect that is decidedly pathological. In cases of this kind, the revival of earlier experiences is often entirely suppressed. Should the person retain part of the old and familiar contents at the same time as new and strange ones are developed, a splitting of the superficial ego will result, marked by a partial loss of memory. If the past is later recaptured, the individual may become quite aware of the changes that have taken place in his ego. Should the process be repeated with recurrent lapses of memory, there may be a most astonishing multiplication of personalities or characters. Presumably, in each instance where the smooth and uninterrupted current of conscious contents is deflected or changed, the individual enters into a new field of experience, carrying with him the conviction that he is a new person, as the situation demands. This adoption of several rôles by the same individual is compared by Johannes Lindworsky to the *dramatis personae,* where many parts are taken by a single actor. But with the difference, of course, that whereas the actor can, at any moment, become aware of his off-stage life, the subject of multiple personalities or characters cannot retrace his steps to a normal existence, but is condemned to face the world with the particular ego which his presently-evolved constellation of percepts, images, thoughts, and feelings imposes on him. It should be noted, however, that even under the most marked schizophrenic conditions, there is not a shred of scientific evidence to prove a change in the ontological ego.

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Chapter 32
CHARACTER

1. The Notion of Character

When first used by the Greeks, the word *character* seems to have stood for some kind of personal mark that was put on one's possessions, to identify them and indicate ownership. Later on, it came to mean any generally recognizable sign. It is not surprising, then, that it finally took on its present psychological meaning of a manifold of actions and habits that distinguish one person from another. As we noted in our last chapter, the notion of character is similar to that of personality, since both are manifestations of the ontological ego, and both presuppose a patterning of our rational powers. But, whereas the latter, strictly speaking, is a psychological entity, the former is essentially a matter of morals. Hence, we speak of a man's personality as pleasing or colorful; but we refer to his character as good or bad. With this distinction in mind, therefore, we may define character as *the principle of our morally controlled actions.*

2. The Elements of Character

Again, like personality, character is not something that is given from the start—though it builds on certain factors that must be taken for granted. Thus, every individual has some sort of environment into which he is born and which is bound to be an influence as he grows to maturity. Every individual, moreover, has a nature of his own, with powers that can be brought to different degrees of perfection. Now, all these things have a meaning for the development of moral habits; and the shape of such habits is the key to one's character.

I. ENVIRONMENT

The relation between environment and character is shown by the way a person represents himself to the world at large. It includes his reactions to such factors as food and climate, blood ties and country; his home and school associations; his social, political, and religious surround; in a word: to the milieu in which he lives from day to day and to which he must learn to adapt himself. Perhaps, instead of milieu, it would be better to call it the world of the non-ego; for while it is inclusive of people as well as things, it still is not himself. Yet it is not less real and operative on his character, simply because it is not part of his inner self.

II. INHERITANCE

Whereas environment affects an individual from without, the influence of heredity is essentially from within, since it embraces all those factors that he derives from his ancestors. Because of this greater intimacy with self, it is now generally agreed that the latter is far more important for the evolution of character than the former. Thus, heredity means not only the possession of powers such as are common to all human nature, but also the latent possibilities for a more or less perfect unfolding of these powers, dependent on the kind of body with which one is born. The rôle of environment, on the other hand, is mainly to modify these possibilities, especially in setting up the goals towards which they will move, and providing the medium in which they will operate. Now, from the point of view of what we inherit, temperament and disposition are most important in the genesis of character.

Temperament is immediately correlated with the tissues and organs of the body, and particularly with the glands and nervous system. Since the days of Galen, it is customary to divide it in four different ways: first, sanguine, marked by a hopeful though not always tenacious attitude towards life; secondly, phlegmatic, manifesting itself in a cold and sluggish manner of reacting; choleric, the type that radiates energy and is liable to strong passions; fourthly, the melancholic, distinguished by a tendency to sadness.

Disposition, on the other hand, is usually explained as a function of innate tendencies, particularly of instincts, with all their widely spread forces of feeling and emotion. We say, for example, that a

Chapter 33
FACULTIES

1. Approach to the Problem

St. Thomas has laid down some definite rules to guide us in our inductive study of faculties. It is significant, in view of later misunderstandings, that the method he recommends is quite the same, in its main features, as the method used by research workers today. "A power," he says, "by the very fact of its being a power, is directed to some kind of act; so that we should be able to know the nature of the power from the act that it is intended to produce . . . Acts, in turn, are basically different because of differences in the nature of the objects [that arouse them]." Aristotle had insisted on the same order of induction when he said: "To be able to say what an intellectual or a sensitive or a nutritive power is, we must go farther back and first give an account of the process of thought or sensation [or nutrition]. For, by the rules of analysis, the question of what a thing does precedes the question of what it is able to do. Moreover, if this be correct, then we should go still farther back, and get a clear notion of the objects of each act; for example, in the cases just cited, of food; of what is sensible; of what is intelligible." Thus, for a thoroughgoing resolution of the problem of faculties, three stages must be observed: analysis of objects; analysis of acts; analysis of powers. Obviously the procedure, as pictured by Aristotle and Aquinas, is a strictly scientific one, with which it is hard to see how even the most critical modern system can find fault. Most of the current writers who experience difficulty with the theory of faculties have never had occasion to examine it in its native background. For this reason, we shall try to present it as St. Thomas himself understood and developed it. The essential

features of his method will be retained, with certain changes of terminology that will make it easier to discuss his teaching in its relation to modern thought and experiment.

2. *Object Analysis*

An object, as we pointed out on a previous page, is something that is "thrown up against" a power, and therefore something with which the power can grapple, so to speak, and react to. The essence of a thing, for example, cannot be apprehended by sense. Hence, it is not an object of sense but of intellect, which is the only power that can deal with it. Again, color is perceived by the eye but not by the ear. And so with all our other faculties: each has an object to which it properly responds; each, as St. Thomas clearly teaches, has a relation to reality, or an "intentional" aspect, by which it is naturally inclined to be aroused by a particular kind of stimulus. The converse of this is also true: that objects have an intentional aspect, since they are intended by nature to arouse certain powers. Thus, the fact that we actually live, sense, feel, reflect, decide, and move, can be finally explained only on condition that a real world of objects exists—a world, moreover, that is different from the powers that it activates. For example: if I am conscious of a color, or a sound, or an odor, the reason of my consciousness must be ultimately sought in certain properties of matter. Again, if I am acquainted with a science, say astronomy, then the truths of that science are not projections of my mind, any more than the stars themselves are the products of my thinking; rather, the knowledge that I have is simply a way mind has of looking at things that exist in complete independence of it. And so the recognition of *objectiveness*, given in every act that we perform, is a primary datum in the analysis of faculties; and any effort to account for their nature or to set them in order must begin with the admission of a world of reality—an objective world of things—to which the movements of our powers are related as effect to cause.

3. *Act Analysis*

Strictly speaking, what nature actually does is the only scientific guarantee we have of what it is able to do; and this is as true of human nature, with its living properties, as of physical bodies that have no life. But without a world of objects, exerting its influence

in divers ways on the powers of our nature, these latter would remain passive and in a state of frozen immobility, like seeds in a winter soil that cannot germinate until the action of sunlight releases their secret energies. Moreover, the fact that mind and matter are linked together to form a psychosomatic unit, also suggests that the powers of our nature, even those of an intellectual order, are somehow dependent on the body in their operation. It would be a complete misunderstanding of our faculty of thinking, for example, to take it out of its material context, or to suppose that it is not conditioned by the acts of our sensitive powers. It is! And for the simple reason that man is a union and a balance of material and spiritual elements; so that every act he performs is somehow influenced by this fact. Finally, in favor of the early scientific and Wundtian view of the subject matter of psychology, as against the later behavioristic position, it may be said that the supremely active factor in our lives is *consciousness*, both intellectual and sensitive. Thus, man's most unique title is *homo sapiens*. He is able to go beyond the informations of sense that would keep him on a plane with other animals, and to ascend the mountain of abstract knowledge—where he can produce motives of a sapiential nature for the movements of his appetites and power of locomotion. But even as a thinker, he must live, grow, and propagate if he is to survive; hence, in any complete enumeration of his powers, one must begin at the bottom, where he functions as a vegetable. This is the way St. Thomas approaches the problem; and his composite picture of man shows him, first, as a biological organism, sharing his life and faculties with the plant; then as a sentient organism, manifesting his nature in a whole series of psychosomatic acts that he produces in common with the animal; and finally as a thinking organism, with reason and will and all their creative movements that are properly his own.

4. *Faculty Analysis*

From the fact of differentiated acts, Aquinas is led to infer to the existence of differentiated powers. By the terms of his psychological analysis, therefore, a faculty is *a special ordination of nature to perform particular kinds of acts, on the presentation of an appropriate object*. From this point of view, there is no difference between faculty, power, and property. All are accidents that

flow from the nature of the thing that possesses them; and their manifest purpose is to allow for the fullest expansion of that nature. Moreover, in the system of Aquinas, no postulate of faculty is made, except where functional evidence is forthcoming for its real existence. This, however, does not mean that powers are absolutely dependent on acts and objects, since the ordination which is part of our definition of power represents an innate tendency. For example: because a child does not manifest insight at the time of his birth, we cannot conclude that he does not have the power to think. All that can be rightfully inferred, in view of the universal experience of human nature, is that he is unable as yet to use his reason, or to make it apparent in his outer actions. As a matter of fact, this is the attitude with which we must approach all our human faculties. Thus, while their division into species cannot reach beyond the data of observation, yet, once the common testimony of mankind has established a faculty as part of our nature, it is unreasonable to deny anyone the title to this faculty solely on the grounds that he has not given active proof of its existence.

By what general principle, then, do we say that one power in our make-up is different from another? According to St. Thomas, by the orientation of the power towards a specific goal called its *formal object,* and which it attains by a movement that is specifically different from the movements of other powers. A fruit, for instance, is perceived as colored, sweet, fragrant; it is remembered as a fact of past experience; it is thought of as a kind of food; it is desired as something good to eat. Now, each of these aspects is the object of a particular power; or, as Aquinas would say, each is a "formality" that appeals to one power, designed by nature to appreciate it, but not to other powers. On this basis, let us now see how he works out his classification of human faculties.

I. VEGETATIVE LEVEL

We begin life with three basic abilities: *nutritive power,* which makes possible the conversion of non-living matter into the cells, tissues, and organs of the body; *augmentative power,* which enables us to grow, and by intricate processes of specialization, to reach a state of physical maturity; *generative power,* whose object is to pass on life and so make provision for the continuance of the race. The last-named power is the most important, according to St. Thomas:

not only because it concerns a common rather than an individual good, but also because the functions of nutrition and growth are a kind of reproductive activity wherein the body generates itself anew by the assimilation of food, and increases in bulk by the division of its cells.

II. SENSITIVE LEVEL

At the sensitive level, the first group of powers deals with knowledge. Some of these have end organs that face on the world of matter. Their task is to make us conscious of the external accidents of bodies. They comprise the outer senses: *touch* or *somesthesis; smell; taste; hearing;* and *vision.* The others are inner senses, mediated in their functions by the cortex. They have no special receptors for making immediate contact with the accidents of matter, but must depend for their constructs on the information that they receive from the outer senses. They are, as we know: *common sense,* which enables us to perceive objects as a whole, with all their spatial and temporal attributes; *imagination,* or the power of representing the objects of sense in their absence; *memory,* which recalls past experiences, precisely as past; and *estimative* or *cogitative power,* whose basic function is to discriminate between the useful and harmful aspects of an object. The next group of powers is much smaller. They are the tools of desire, not of knowledge; and since their major concern is in things rather than the external accidents of things, they need not be multiplied, as in the case with the senses. So, there are only two sensitive appetites: *concupiscible,* occupied with the goods of sense; and *irascible,* whose work is to fight when difficulties are encountered. Finally, we have a *power of locomotion* which, though numerically one, is able to express itself in a variety of ways, according to the kind of behavior that is demanded of the organism.

III. INTELLECTUAL LEVEL

For a complete explanation of the birth of ideas, two mental powers must be entered on our list: *active intellect,* whose task is to abstract; and *possible intellect,* which understands, judges, and reasons. Finally, just as sense is correlated with animal appetite on the sensitive level, so the faculty of thinking is correlated with *will* on the intellectual level. This is the power of volition and

choice, of determining tendencies and controlled movements; the commander-in-chief of all other faculties; the responsible agent of human actions. Our diagram shows how Aquinas groups the properties of human nature and the names he attaches to them.

Abilities of Man

- vegetative
  - i. *nutritive*
  - ii. *augmentative*
  - iii. *generative*
- sensitive
  - cognitive
    - iv. *touch (somesthesis)*
    - v. *smell*
    - vi. *taste*
    - vii. *hearing*
    - viii. *vision*
    - ix. *common sense*
    - x. *imagination*
    - xi. *memory*
    - xii. *estimative (cogitative)*
  - appetitive
    - xiii. *concupiscible*
    - xiv. *irascible*
  - motor
    - xv. *locomotive*
- intellectual
  - cognitive
    - xvi. *active intellect*
    - xvii. *possible intellect*
  - appetitive
    - xviii. *will*

5. *The Theory of Aquinas and Modern Research*

I. VEGETATIVE POWERS

The vegetative powers, enumerated by Aquinas, have been repeatedly confirmed by biological study which centers around the contrasted functions of nutrition (survival of the individual) and reproduction (survival of the species). Specialization and the equipotential nature of the embryo are aspects of growth; while tropistic movements, which are suggestive of animal reflexes, manifest the principle of continuity: the immanent principle of life which tends to close up the gap between vegetative and sensitive functions.

II. SENSITIVE POWERS

The powers that we share with the animal are divided between cognitive, appetitive, and locomotor.

A. *Cognitive.* The outer senses have received more attention from the modern psychologist than any other group of powers. This is quite natural, since faculties with end organs and measurable stimuli lend themselves most easily to experimental techniques. Aquinas, as we know, holds for at least five distinct kinds of external sense. I say "at least five" since he allows for the possibility that *tactus* or somesthesis is a gender. In this case, cutaneous, muscular, equilibrial, and organic would be the species. The criteria on which he bases his distinction of outer senses are three: object or stimulus; end organ; and function. Thus, each power is constructed by nature to react to some aspect of an object; and there is a fundamental relation of adequacy between the two. Although the Müllerian doctrine may be true—that we distinguish sensations because end organs have different nerve terminals in the cortex—experience tells us that stimuli, too, have a hand in the discernment of qualities, since only that stimulus is favored which is able to arouse a nerve current. In any event, consciousness always reacts in characteristic fashion to objects presented through the channels of sense. Moreover, as introspection shows, there is a continuous shading between the phenomena of a particular sense, for example, in the perception of red, yellow, orange, and so forth; but no transi-

tion can be discovered from one modality, such as vision, to another, such as hearing. Charles Hartshorne has attempted to establish such a merger by his assumption of an affective continuum that spreads a film of feeling, so to speak, over all our sensations and imperceptibly links one modality with another. But this is not borne out by the facts of experience. To say, for example, that the colors of a sunset and the tones of a minuet form a continuum in consciousness because both are affectively pleasant when perceived together, does not explain why the qualities of each make different impressions on us. And different they most certainly are, if introspection is any guide in the matter!

For St. Thomas, speciation of the inner senses is also secured by a difference of formal objects. Thus, common sense perceives things as present and synthesized; imagination, as absent; memory, as past; and estimative, as beneficial or harmful to the organism. Now, modern psychology, in the main, has had little use for faculties. Yet, it divides its problems in a manner that is suggestive of powers; and the separation of subject matter, in most of the texts, fits in well with the faculty analysis of Aquinas. Perception, imagery, and the processes of instinct are usually treated as distinct data of consciousness—though the difference between imagination and memory is not clear. To be sure, this does not mean that the moderns, in such cases, hold for a distinction of powers. For example, some would argue, as probable, that there is only one central sense, whose work is to perceive; and that imagining, remembering, and estimating are merely extended activities of this single perceptual power. To make an even greater reduction, other psychologists maintain that central sense is the *only* power of sensitive knowledge, the principle of imagery as well as of perception; and that the movements of the outer senses are purely physiological in nature. Such radical simplifications, however, are not warranted by experience; and there are no findings from the laboratory that verify them. On the other hand, it is only fair to say that experiment does not establish the four-fold division of Aquinas. In fact, I should be inclined to say that the formalities on which he grounds his division, are revealed by philosophical inference alone—emerging from our attitudes of consciousness towards objects as present, absent, past, and useful. Finally, the majority of psychologists would still seem to hold that

sensation is a mixture of physiology and consciousness; or, more accurately, that it depends on nerve processes, but is a function of knowledge.

B. *Appetitive.* The movements of our sensitive appetites form one of the most difficult problems of psychology, in spite of the fact that feelings and emotions are matters of common experience, and that their physiological basis has been the subject of a great deal of experimental work. The distinction of concupiscible and irascible appetites, on which St. Thomas founds his whole theory of sensitive orexis, is confirmed by the modern distinction of mild and emergency emotions which, as separate species of phenomena, must have separate sources of origin. One view, however, to which the Angelic Doctor would not subscribe, is the classification of conscious data under the headings of cognition, appetition, and conation. Cognition and appetition, of course, he admits as distinct categories, though he is always careful to add that cognitive and appetitive movements are further divided between sensitive and intellectual levels of operation; that an idea, in short, is not the same as a percept, though both are forms of cognition; or an emotion the same as a will-act, though both are forms of appetition. But the principle of economy would force him to reject conation as a separate category. Thus, in its modern meaning, *conatus* is simply a conscious urge to act, or a conscious striving for a goal. From this point of view, it is the active phase of an appetite, and therefore an aspect of appetition. In fact, one would be just as logical in saying that the human race is made up of men and Englishmen, as to hold for a difference between appetitive and conative phenomena.

C. *Locomotive.* According to Aquinas, the execution of behavioristic movements, such as grasping things, gesturing, walking, running, speaking, and so forth, is attributed to the power of locomotion, which functions through the musculo-skeletal and nervous systems. Outer action has been the subject of a wide range of experiments. In a special manner, the behaviorists and response psychologists have chosen this field for research; and while their work has proved very fruitful in results, it has not always been soundly interpreted. Thus, to commit oneself to the view that thought processes are accounted for in terms of muscular reflexes, or that intellectual consciousness is explained by the closing of sensori-motor arcs, is certainly at loggerheads with Aquinas's concept of the

faculties than Charles Spearman, father of factorial psychology. As he himself declares, nothing was ever wrong with the traditional teaching on the problem, since all that faculty meant was: first, the grouping together of certain acts that obviously were related; and then the assignment of such acts to a single principle of operation. Where things went amiss was when the later-day psychologists set out to measure each faculty, assuming for this purpose that one member of a class of acts could represent all the rest. Visual and auditory recall, for example, are both movements of memory; yet one is surely no gage of the other. Similarly, what we know about logic is not a criterion of our ability to master a language, though both must be products of the faculty of intellect. To clarify the problem and give it a sound footing in science, Spearman constructed his theory of factors. Previously it had been supposed that the abilities of man were either perfectly correlated or perfectly uncorrelated. The remedy against such a supposition, which never was supported by evidence, lay in the devising of a method by which correlation could be accurately measured through the use of coefficients. These are a series of numbers that become unity when two compared abilities go perfectly together, but drop to zero when the abilities are found to be independent. By actual test, neither of these effects was achieved, although a surprising impression of regularity was revealed in the correlating process.

At the end of his work, Spearman found that the correct reading of the scores hinged on the postulate of two basic principles: first, *g factor*, or general intelligence, which remains identical in all our aptitudes; and *s factor*, or special ability, which differs freely from one kind of aptitude to another. In time, other factors were added to the picture, each the result of carefully planned studies. Thus there is *p factor*, or perseveration, which manifests itself as a broad form of inertia, making it difficult for a person to pass rapidly from one kind of psychological operation to another. Again, on the characterological side, there is an apparently independent ability which has been labelled *w factor*, or will. Those who possess it in high degree tend, as a rule, to act more on principle than on impulse. Evidence for additional factors has been found, though knowledge about their nature and range of operation is not yet complete. One of these more obscure entities is *o factor* or oscillation, which reveals itself in a form of output that is vari-

able from moment to moment and over a wide field of activity. In the matter of special abilities, investigators claim to have discovered moderately broad factors dealing with language, mathematics, music, and mechanical work.

As experiment continues, it may be possible to achieve a full scientific picture of man's aptitudes. But it is worth while repeating that the faculty of Aquinas is always in the nature of a broad factor, representing an ability to perform a large class of operations that are grouped together because they have some internal connection with one another. Thus, visual memory and auditory memory may be reckoned by the modern factorialist as separate abilities; but for St. Thomas, they are functions of the same power of recall. So, an aptitude for physical science may go along with an aptitude for the philosophy of nature; but again, they spring from the same power of understanding. One thing can be said with certainty: that the factor psychologist has brought no new faculties to light. Rather the trend of his work has been towards a more minute resolution of powers that are already contained in the traditional list of Aquinas. On the other hand, there is this difference to be noted: that whereas the map of human faculties, drawn by St. Thomas, is the outcome of common observation—the base of his whole psychology of human nature—the map of factors and abilities which science is now furnishing with so much rich detail, is the result of special observation and the use of laboratory techniques that make possible a more refined knowledge of particular powers.

7. Tests and Measurements

The development and scientific use of mental tests has proved to be one of the most interesting branches of modern psychology. The very existence of such tests, of course, presupposes some kind of faculty to be explored and measured; and as we pointed out above, Spearman was one of the quickest to recognize that all psychometric research is founded on the traditional concept of powers or properties. Most of the efforts of the early experimenters, like Francis Galton, Hermann Ebbinghaus, and Alfred Binet, were fixed on the general ability of the individual to grasp things; and the thing revealed in each case was presumed to be intelligence. Naturally what they were able to uncover showed itself as a very broad

factor. The tendency, at first, was to take for granted that the measured ability was independent of experience. Though correct in the main, it has been since found that intelligence (and, indeed, every other cognitive power) is always conditioned by actual achievement; that what is examined and measured is never pure intelligence, but intelligence unfolded and brought to a certain degree of perfection by exercise on the objects of experience. Besides the higher intellectual movements, in which insight is applied to the solution of problems, the acts of the presentative senses, memory, and motor ability have also been subjected to the testing procedure. Nor have the appetitive aspects of life been neglected. Thus, the theoretic and practical value of character charts has long been admitted, although no standardized method of measurement has been developed as yet. This is not surprising in view of the fact that feelings and emotions, as well as the various forms of volition and volitional control, are among the more difficult and obscure areas of psychological research, and much less amenable to analysis than the cognitive aspects of our nature.

8. *Individual Differences*

The orientation of psychometrics towards at least an implicit acceptance of the traditional theory of faculties, is seen to best advantage, perhaps, when we look at some of the more important conclusions that emerge from mental measurements. Thus, it is a matter of general agreement among testers, first, that there are established differences in the way our abilities operate; secondly, that each difference represents a tendency to act in a particular way; thirdly, that differences in abilities are given from the start, though their gradual unfolding is likely to show the effects of both training and environment; fourthly, that natural abilities differ from one individual to another. The observations of St. Thomas on differences of intellect are of interest here in view of the foregoing conclusions of the testers. One person, for example, has more insight than another, either because his body is better disposed by its whole physiological texture to react to the influence of mind; or because his senses in particular, both outer and inner, are more adept in responding to stimuli and in refining the data of experience—thus supplying better material for the process of abstraction. And even in cases where the endowment of intellect is the same, it is still

possible to find differences between individuals due to background, training, and habits of study.

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SECTION 2. THE PHILOSOPHY OF INTELLECTUAL LIFE

Chapter 34
THE NATURE OF INTELLECTUAL KNOWLEDGE

1. Schools of Interpretation

It is hard to overestimate the importance of a correct understanding of the inner meaning and nature of human knowledge. The issue is so fundamental that whole systems of thought and action have taken their origin from the point of view that one adopts in interpreting our cognitive experiences. When these have been carefully examined and their implications reduced to simple principles, it will be found that there are three ways of evaluating the processes of mind: either *as events of a purely sensitive order;* or *as events of a purely intellectual order;* or *as a manifold of both.*

I. SENSISM

If knowledge is rightly looked at as a movement in which object is united with subject, then sensism is guilty of overstressing the former at the expense of the latter. Examining the writings of the Greeks, we can find a clearly developed attitude of this sort towards the phenomena of human cognition. Democritus, for example, held that we know things because of minute image-particles that stream off their surfaces and eventually reach consciousness through the avenues of sense. Thus, our ideas are the products of sensations; and they are limited, like the latter, to the concrete and the singular. Now, the basic elements of the Democritean interpretation, which reduces mind to a power of matter and wipes out the distinction between thinking and sensing, have appeared at regular intervals in the history of psychology. David Hume, Alexander Bain, James Mill, Thomas Reid, and Herbert Spencer were all sensists; and the influence of their teaching is far from

inert today, as we see in some of the systems. Edward Titchener and the structuralists, for example, explain the processes of thought as movements of image-formation; or—in the still more naïve manner of Democritus—as sensations of a washed-out and indistinct nature. John Watson and his followers translate thinking into a series of sub-vocal reflexes. Wolfgang Köhler and many of the gestaltists make our insights subjectively dependent on cortical activities.

But theories of this kind leave several things out of account. They make no recognition of the fact, first, that the mind of man shows a tendency towards inherent variations of consciousness, in spite of the constancy of external stimuli; secondly, that it is able to abstract and generalize and set up intellectual comparisons between the data of sense; thirdly, that the content of thought, as analyzed by scientists who have developed special techniques for this kind of experiment, is irreducible to any datum of sense, in the perceptual or imaginal order. The views of the experts here agree exactly with those of Aquinas who teaches that we have two levels of cognitive powers: "one, sense, which acts through a bodily organ and grasps things only as they exist in individual matter—whence its range of knowledge does not extend beyond the singular; the other, intellect, which is not the act of a corporeal organ, and which apprehends natures . . . not as they exist in individual matter, but as abstracted therefrom by an act of intellectual consideration. With the mind, therefore, we are able to lay hold of these natures in a universal way—a feat that is utterly beyond the power of any sense."

II. INTELLECTUALISM

If the tradition of sensism exaggerates object or matter at the expense of subject or mind, the tradition of intellectualism falls into the opposite error. Again, it is necessary to go back to the Greeks if we are to find the roots of the exaggeration. Plato was the first great idealist. According to his teaching, concepts are unconnected with the data of sensation, are in fact wholly free of any dependence on sense. Then how account for their origin? They are inborn, that is, present in the intellect from the first moment of its existence. The doctrine of Plato was founded on the presumed impossibility of deriving abstract and immaterial ideas from concrete phenomena, such as sensations, percepts, and images.

The Platonic theory, like that of Democritus, has won many followers down the ages. René Descartes, for example, refused to admit any causal interaction between mind and matter. His views, in turn, gave rise to two other extravagances of opinion: those of Arnold Geulincx and the occasionalists, who held that the conceptual process is paralleled by a perceptual process, but that the two have no internal relationship; and those of Nicholas de Malebranche, Vincenzo Gioberti, and other ontologists, who contended that since extended matter can make no impression on inextended mind, our ideas must be divine in origin. Idealistic tendencies are also apparent in the writings of Immanuel Kant, Georg Hegel, and their followers. In more recent times, it has been pointed out that Franz Brentano's *intentional inexistences,* implying the presence of objects of thought as intended but not real; as well as the *mental creation of form-qualities* which is a principle of Christian von Ehrenfels, Alexius Meinong, and the Gratz school generally, are at least reminiscent of the Platonic position that intellect has no contact with the palpabilities of sense.

Against Plato and his tradition, certain facts of experience have been recorded by St. Thomas. Thus, the emergence of ideas from the data of sense is the only condition on which the elements of science can be acquired. Moreover, where such data are absent, as in the case of an individual who lacks a special sense, no intellectual knowledge is developed. Again, the habit of illustrating abstruse ideas by examples that are obviously sensible, implies a connection between the movements of intellect and sense. Finally, and for Aquinas, the most telling fact of all: if it is natural for mind to be united with matter, then it is natural for intellect to be helped by the senses. Indeed, without this cooperation, it would be impossible to explain how intellect gets at its object which is the essence of corporeal being—an essence, therefore, that is enclosed on all sides by the accidents of matter.

III. REALISM

St. Thomas's own views of the meaning of man's knowledge are both moderate and realistic. They trace back to Aristotle whose teaching concedes something to both Democritus and Plato, yet has an element that is properly his own, the fruit of his splendid inventiveness. Human cognition is an elaborate affair. It begins with

sense data that are concrete and singular; but it ends with ideas that are abstract and universal. Democritus failed to see any difference between sense and intellect; and so he was unable to explain how our knowledge ends with the universal. Plato, on the other hand, made no distinction between intellect that abstracts and intellect that understands; and so he could not account for the fact that our knowledge begins with the singular. The key to the position of Aristotle, therefore, is the postulate of an active intellect which is placed between the senses, on one side, and possible intellect, on the other. We have already seen how it works in bridging the gap between the singular and the universal; but a brief review, with St. Thomas, will help us fix more firmly in our own minds the chief moments of ideogenesis.

At the beginning, possible intellect is devoid of all knowledge; and nothing can be done about filling it until the senses start operating. The eye must see color and the ear hear sound, if mind is to have ideas of the meaning of these things. But the data collected by the end organs are like undigested masses of food. Before they are ready for absorption they must be worked over and combined into palatable wholes; and this is the task of common sense and perception. Then by a process of psychological osmosis, they pass on to the other interior senses where they appear within consciousness as images or phantasms; and when this stage of their refinement is reached, they are prepared for their final transformation which will elevate them from the order of the sensible to the order of the intelligible, and make the objects that they represent actually capable of being understood. It is at this point, therefore, that agent intellect comes into play—bringing its light to bear on what it sees pictured in the phantasm; considering only the nature of its object, apart from its individuating notes; lifting that nature, so to speak, out of its context of the concrete and singular; creating a form that is free of all matter and that can act as a stimulus on a power that is matterless. The last step in the process—to complete our analogy—is the feeding of this form to possible intellect: whereupon an idea is produced; and the movement that St. Thomas calls simple apprehension, comes to a close.

But for minds that are united with bodies, simple apprehension is not enough. Truth is arrived at only by judgment, that is, when one apprehension is added to another. Moreover, truth is assured

only when the judgment so formed corresponds with things as they are. Reality, after all, is the basic measure of truth; and our knowledge is right in proportion as we succeed in laying hold of "that which is," and of identifying ourselves, intellectually, with the object of our thought. But how can we be sure that what we know is something real? Only by retracing our steps from end to beginning of the process of cognition. Thus, active intellect abstracts from a phantasm that is derived from experience; and experience is the outcome of actual contact with the world. Both the abstraction and the experience must be real in this case—at least as real as the objects of which they are conscious counterparts. And lest we lose sight of the objective features of our knowledge, St. Thomas is careful to insist that the idea is not that which is known, but that by means of which we know. What is grasped, first and foremost, is the *thing;* and the idea is simply the intermediary between the knowing subject and the object known, enabling the latter to become identified, in an intentional way, with the former. The primary purpose of the idea, then, is not to arrest our consciousness (though the idea, too, can become an object of reflection, as Aquinas points out), but rather to direct our thinking to the thing it represents. Only on this condition can our knowledge be objective; and only when it is objective are we certain of its truth.

2. *The Distinction of Human and Animal Forms of Cognition*

By human cognition we mean that special kind of knowledge which is proper to man, revealed inwardly by introspection and outwardly by intellectual behavior, but which has never been found to exist in the animal: the sort of knowing, in short, that means grasping relationships in an abstract way. To be sure, we cannot directly observe what goes on in the consciousness of the animal. But we are able to study its exterior way of acting; and on a basis of what it does objectively, as the fruit of knowledge, we shall compare the accomplishments of the animal with those of man.

I. LANGUAGE

The functions of language, as the outer manifestation of the ability to abstract, have been clearly summarized by Karl Bühler: first, to represent facts or bodies of knowledge that the speaker or writer has apprehended; secondly, to transmit this information;

But conscience is meaningless without freedom of will; and freedom is possible only to creatures that have the power of abstraction. On the other hand, there is no observable datum in the life of the animal which would lead us to suppose that it possesses a conscience. Its behavior is measured and determined by instinct, with no apparent discernment of ethical values in anything it does.

From the communal point of view, human society is agreed on the acceptance of certain laws, which it looks at as just and conducive to its welfare as a body of citizenry. Most enactments of this kind are regulative in nature; but howsoever we interpret them, their existence is accounted for only on the basis of an abstract knowledge of relationships. They need not imply a high degree of intelligence; and they may be motivated simply by an instinct of self-preservation. Yet as laws, they require reason, since they are founded on the principle of a recognized common good. Now, nothing even remotely resembling such enactments is found in the animal kingdom.

IV. ART AND ESTHETICS

According to Gustav Fechner, beauty is essentially a matter of relationships; and its appreciation connotes an intellectual grasp of the order of parts to parts and of the harmony of the whole. This fits in well with the notion of St. Thomas, who defines the beautiful as a manifold of elements that are at once integral, proportionate, and distinguished by their clarity. Anything that fulfils these conditions may become an object of esthetic pleasure: colors and tones; the shape and pattern of lines and the rhythm of movements; the impalpable elegance of ideas; the attractiveness of virtue and the good life. Now, it is the function of art to capture such beauty and so expose its lineaments that all men may enjoy it. But art is impossible without intellect, since it demands that the artist order his creative movements according to ideas that he abstracts from matter, and which he will re-embody in matter when he produces his masterpiece. It is scarcely necessary to add that of esthetic appreciation of the beautiful, such as we have just described, there is absolutely no token in the life of the animal.

V. RELIGION

Whether we hold for a polytheistic theory, or for the view that primitive peoples worshipped only one Supreme Being, the significance of religion, as a criterion of difference between man and the animal, lies in the fact that it is based on convictions. Now, convictions are the outcome of intellectual procedures, to which will adds an element of firmness. Essentially the same kind of thinking which guides the cultured man today led the earliest human beings to accept a divine power, even though this latter was often clothed with the attributes of man. The existence of prayer, and the manner in which it was developed among the lowest cultures of our race, is proof enough of the exercise of reason. Moreover, belief that divine power could deal out mercy or punishment is logically associated with sacrifice as a mode of propitiation.

Studies in individual religious growth only strengthen the case and make wider the gap that separates us from the animal. Doubt, for example, is a common phenomenon at the age of puberty. If and when it passes, the individual may expand religiously in several directions. As William James shows, in his interesting survey of religious types, one man may show more inclination to the contemplative than the active forms of worship. Another may grow into a fixed optimistic attitude in matters of belief. Another may become an out-and-out pessimist, or doubter, or scoffer. Balance of character, in these matters, depends externally on the religious environment into which one is born; and internally, on the training that is given to one's powers, and the kind of moral habits that are cultivated. Then there is the further unquestionable fact that, apart from age, sex, position, or surroundings, religious values have more meaning for certain individuals than for the general run of men. The only satisfactory natural account that can be made of this peculiarity, is the possession, by such individuals, of a special aptitude for religious experience.

The cumulative force of all the evidences that we have presented in this section is overwhelmingly in favor of an essential distinction between man and the animal. Not all modern psychologists are prepared to admit the difference; but those who demur likely do so because of a misapprehension about the true meaning of insight and intelligence. In any event, Julian Huxley is far from being an

isolated instance among the scientists when he says: "There is no evidence at present that even the highest animals possess ideas." Indeed, it is difficult to see how the investigator can dissent from such a point of view after the work of scholars like Johannes Lindworsky who, from inductive studies, have shown the utter impossibility of establishing the presence of abstract knowledge in the animal's consciousness.

3. *The Principle of Immanence*

For St. Thomas, the basic tool in distinguishing between intellectual and sensitive life is the degree of immanence that knowledge displays. We have already pointed out how the same criterion marks off the animal from the plant, since the latter has no power of consciousness and so must be inferior to all sensitive organisms. Applying the rule of immanence to human cognition, Aquinas holds for the superiority of man's mind on three special counts. First, it has the power of reflection and is able to understand itself. By comparison, no sense power can turn back on itself, or know itself as a subject in knowing its object. To do so, it would have to be at once the principle and term of its conscious activities. Secondly, man's mind can penetrate to the core of reality. By means of ideas, it is able to seize on the essence of things. Sense, on the other hand, is occupied only with external accidents. Mind, too, of course, can apprehend accidents; but whereas sense is simply aware of the fact *that* they are, mind is able to know *what* they are. Thirdly, sense can reach a point of saturation that makes it difficult to react to continued stimulation. But mind, exercised with an object that is hard to understand, is all the more capable afterwards of dealing with objects that are easier to understand. The reason of this is also the reason of the other two facts just cited by Aquinas: that while sense, in its movements, is dependent on matter, mind is intrinsically free of the need of any organ.

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Chapter 35
THE NATURE OF VOLITION

1. *Schools of Interpretation*

When we say that will does not function except under the influence of a recognized motive, does this imply that it is inwardly forced to act? To answer the question properly, we must make a distinction. If only one motive is present, and if the value that it represents is a good that is in every way desirable, then will is under a necessary impulsion to act. Thus, what is universally attractive leaves no choice—once will allows mind to present such a value as a motive. If, on the other hand, several motives are considered, and if each has only a particular value for will, then there is the possibility of acceptance of one or refusal of all. Freedom, strictly speaking, has to do with goods of this second sort. Many theories have been advanced to explain the nature of our will movements; but when they have been sifted down, three general points of view emerge: *extreme determinism,* which so surrounds and encases the will with material forces of one kind or another that it has no freedom; *extreme indeterminism,* which goes to the other limit and represents a negation of any will-conditioning factors; and *moderate determinism,* the middle-of-the-road position that holds for compulsion of will in some of its acts, but insists on its essential freedom from necessity in others.

2. *Theories of Extreme Determinism*

I. PHYSICAL DETERMINISM

To say that a purely material force can compel the will to act is to reduce its movements to the level of mechanics. The impossibility of including volition within the system of physico-chemical energies is so obvious that it scarcely calls for comment. The oper-

ations of matter are determined. To extend their field of control so as to embrace the movements of will is to presume that nothing but matter exists. But the very act of making such a presumption is really the best argument against it—just as unwillingness to concede freedom to will, or to allow it a theatre of operations that is above matter, is also, in its way, a proof of freedom. The laws of matter cover one category of events; those of mind and will, quite a different and, in some respects, opposite class of actions.

In this connection, a word may be said about the claims of the theory of psychophysical parallelism whose terms, at least in its orthodox form, include the idea of a completely rigid causality in all the movements of nature. Since the strict application of such a law to an agent like will would destroy its freedom, the parallelist sees no alternative except to admit an absolute separation of physical and mental energies in all man's vital acts. The fact is, of course, as experience testifies, that matter and mind can and do mutually influence each other—so that will movements and bodily movements are not irreconcilable. The difficulty is resolved when we remember that, according to the teaching of the traditional psychology, the will-act does not interfere with the established cosmic arrangements of matter, much less with its energizing, both inside and outside the body. All that volition accomplishes is direction and control of the course of such physical energies, without adding to or substracting from their quantum as a whole. Certainly this is no threat to the law of conservation, about which the parallelists are so deeply concerned.

The problem of human freedom has been given a new setting in scientific circles with Werner Heisenberg's introduction of the *principle of uncertainty* into the field of physics. It was once thought that if the position and velocity of every electron and proton in the universe were known, it would be possible to predict their position and velocity at any future time. The principle of uncertainty states that such is not the case; that the atomic movements of matter warrant no predictions for the future; that physical nature itself is characterized by a basic indetermination. From this it has been inferred that human actions are likewise unpredictable, in view of the nondeterminable electronic configurations of the body—which is absurd, of course, since the freedom of an immaterial power, like the will, in no wise depends on the movements, certain or uncer-

tain, of material atoms. And, even when the faculty of choosing meets with forces in the body that resist its commands, it still remains free in its own inner life, so long as it can will or not will as it pleases.

II. BIOLOGICAL DETERMINISM

The system of psychoanalysis is founded ultimately on biological concepts. The highest ambition of its founder, Freud, was to see it become a strictly natural science, like physics or chemistry. Accordingly, the relentless reign of instinct and heredity is constantly put forward to account for personality and character, and the deviations from the normal that they manifest. Man's nature, in fact, is absolutely conditioned by such factors. A strict equation might be drawn up, representing the sum total of human behavior in terms of original constitution, plus the actual life history of the individual, plus the working of particular biological urges. There is no room in this formula for freedom. Will is simply a refined modification of instinct; and the Freudian who attempts to introduce any element of choice into his system, must at once be involved in a sea of contradictions.

Similarly, for the behaviorist, volition simmers down to the inflexible consistency of a reflex arc. Watson makes no reference whatever to will and its phenomena. Numerous determining factors are brought forward to explain why an individual follows a special line of action; but the concept of freedom is as far removed from the Watsonian system as it is from the Freudian. Thus to the external observer, one can act only according to the pattern of his previous training, and in conformity with the strength or weakness of his inherited traits. These elements in his make-up are so strong, in fact, that no other course of behavior is open to him. In like manner, the whole structure of response psychology is built on the assumption that conscious contents, whatever their nature or however they appear, are essentially conditioned by the completion of sensori-motor arcs; so that irrespective of the number and strength of stimuli and their resulting afferent impulses, without efferent impulses and the production of specific responses, there can be no form of consciousness, and therefore no selective volition.

The obvious error in all theories of this kind is their failure to recognize that an act of the will is a datum of the intellectual or-

der, unmixed with matter and unmediated, therefore, by any organ of the body; whereas instincts, inherited traits, reflexes, and motor responses are phenomena of the sensitive order, depending for their existence on matter and its laws. Moreover, complete surrender to the methods of behaviorism can have only one result in the long run: abandonment of the distinction between psychology and physiology. Introspection must remain, if the science of human nature is to survive and develop; and the introspective technique reveals volition as a special form of experience, irreducible to instinct, and internally free of all biological constrictions.

III. PSYCHOLOGICAL DETERMINISM

If biological determinism is the result of a Democritean outlook, wherein the rôle of matter is overemphasized, psychological determinism is the logical effect of a Platonic attitude, in which too much stress is laid on the rôle of mind. The one point of view insists on the driving power of reflexes and instincts, the other on the sheer force of ideas, in shaping the pattern of human behavior. Reduced to its simplest terms, psychological determinism amounts to saying that will must accept the strongest motive or approve of the object of greatest value when it functions. Or, to put it another way: will is forced to acquiesce in accordance with a recognized order of values. The Leibnitzian principle of sufficient reason is an example of this kind of theory; and the same approach to the data of volition is implicit in the Adlerian psychology, by its insistence on intellectual forces—at the expense of will—in the process of character formation. The importance of moral training is admitted, of course; but there is always the underlying assumption that mere acquaintance with the demands of reality, or mere apprehension of the positive values that are best suited to answer these demands, alone suffices to regulate and change the course of one's life.

The facts of experience, however, make us question this determining power of recognized values. For example, we sometimes select things that are consciously identified as lesser values. Or, stating the matter even more simply, we do not always choose the best among several goods that are presented for our consideration. The teaching of St. Thomas is very clear on this point. According to his theory, *choice is consequent on the last practical judgment of mind*, suggesting a preference of one particular value over another.

Thus, will fixes on the good which reason proposes as the thing to be here and now chosen. Freedom is preserved since will is able, according to its inclination, to determine which judgment shall be the last one. In fine, reason exercises only an objective influence on the faculty of choice, by furnishing it with the motive of its selection.

While there is always some motive, then, for attachment to a particular good, it is will, in the last analysis, that is responsible for the judgment on which it acts. Its behavior, in such a case, is comparable to the action of a motorist who switches on his lights in order to see, and then determines the direction of his movements by the light that he produces. Under these circumstances, it is always possible that a lesser good should be accepted, since will can terminate the consideration of intellect at any point where it wishes, and so bring about the formation of the last practical judgment which is the ground of its choice. Of course, a man may be a fool to elect a lesser good; but, as Desiré Mercier observes, he is free to be foolish. And even when no better motive is forthcoming he can always fall back on will itself—the simple desire of doing as he pleases—as adequate enough cause for his choice.

3. *Theories of Extreme Indeterminism*

Exaggerated notions about the indeterminate nature of will and its activities may be traced back to the psychology of René Descartes. While it is true that views of this sort are not common today, they are at least implicitly contained in such phrases as "unmotivated desire," "unmotivated will," "unconscious motivation," and so forth, which are met with in some accounts of volitional phenomena. The need of knowledge as a stimulus to the movements of appetite, on both the sensitive and intellectual levels, is a primary datum in the teaching of Aquinas. Moreover, since insight extends to the apprehension of several kinds of value, there must be a difference in the reaction of will to their presence in consciousness. Thus, in the case of a general value, which exhausts our conception of goodness, we have no alternative; and far from being indetermined, our wills have no choice when confronted with such a motive. To particular values, on the other hand, we can address ourselves indifferently. Thus, no object of this sort represents goodness in its entirety; and so will is free to accept or refuse, according

I. THE NATURE OF OUR IDEA OF GOODNESS

Put very briefly: will is free in its choice of goods because mind is free in the way it grasps reality. Thus, all of us have some idea of the meaning of goodness. A notion of this kind, by its nature, is abstract and universal. It cannot be confined to any particular good, since it applies equally well to every conceivable value. It is free of the contingencies of the singular and concrete; and its very existence is proof of the liberation of intellect from all the here-and-now features that characterize a particular object. When, then, such an object is submitted to its act of consideration, intellect can always compare it with its universal concept of goodness. The result is a basic indifference in judgment, since it sees, at a glance, that what it is dealing with is something finite and limited—whereas only goodness without limits, absolute and supreme, can completely exhaust its idea of goodness. In relation to this latter good, particular goods can even be looked upon as nongoods—which, in point of fact, they are, when laid alongside the goodness that is absolute. But if the judgment of intellect is not constrained by particular values, then neither is the choice of will which is based on that judgment.

II. THE NATURE OF OUR METHOD OF DISCOURSE

Pushing his analysis into the field of our inferential processes, St. Thomas notes how certain propositions in our reasoning are necessarily linked up with first principles; and we can no more deny them than we can refuse to admit our ability to know. Other propositions, however, are not so intimately connected with first principles; and because of their remoteness from the primary laws of thought, we are able to withhold our assent to them. Now, the movements of will follow along the same lines. Certain values, such as happiness and all that is understood to be necessarily associated with it, are presented in such a way that we cannot help but want them. Indeed, for will to refuse to be happy, or to turn away from what represents its universal good, would be exactly comparable to intellect's refusal to accept first principles. But there are other values that do not have this necessary relation to supreme goodness, or to the fundamental tendency of our nature towards happiness. We can think about them in several ways and form different

judgments on their relative worth; reckoning them one moment as desirable, another moment as undesirable, or at least as not needful to happiness. And since this is the state of affairs with our intellectual apprehensions, the case must be the same with the movements of will, which are based on the judgments of reason. To repeat: the same disproportion that exists between first principles and probable inferences, in relation to intellect, also exists between universal goodness and particular goods, in relation to will. But intellect is free to accept or reject a probable conclusion. So will is free to accept or reject a particular good.

To be sure, an argument of this sort can have no weight with the materialists, who confound all vital movements with the physical energies of the cosmos; nor with the Titchenerian structuralists, who reduce the contents of mind to images or sensations; nor with the Watsonian behaviorists, who identify the processes of thought with reflexes of the vocal organs; nor with Köhlerian gestaltists, who explain intellectual knowledge in terms of neural patterns; nor with the Freudian analysts, who make will and its impulses an emergence from instinct. Anyone, in fact, who refuses to distinguish between thinking and sensing is bound to a denial of freedom, since no principle is left for the production of abstract ideas, on which freedom is ultimately founded. But as Aquinas has shown so abundantly, we are limited by neither matter nor instinct in the production of our judgments. Unlike the lifeless elements of nature that are circumscribed by the laws of space and time; unlike the plant that blindly and unconsciously responds to the forces in its material surround; unlike the animal that is driven by resistless desire towards the goods of sense; man can be guided by reason in the conduct of his human affairs. Now, the function of reason is to compare; and in the very act of comparison, to be inclined to several alternatives. Its judgment, accordingly, can go this way or that. In fact, as St. Thomas says, it "may even follow courses that are actually opposed to one another. In any case, it is never determined. Inasmuch, then, as man is a rational creature, it is necessary that he have freedom of will."

III. HUMAN BELIEFS AND CUSTOMS

The fact of human freedom may be deduced also from sources outside of intellect and will. Thus, denial of the power of choice is really a contradiction of all our public experience. Even those who

reject it in theory are seemingly content to admit it in practise, since they conduct themselves in all respects as though they were free. This is particularly so in situations where the rights and duties of individuals are involved. Indeed, the notion of being answerable for our behavior is no different, in its roots, from the notion of human freedom. One is simply the correlative of the other, since no one can be held responsible for what he does, if he be under compulsion to act. "Take away freedom," says Aquinas, "and you take away the meaning of counsel and exhortation; of command and prohibition; of reward and punishment." For, what purpose would any of these things serve, were we unable to amend our judgments and so elaborate motives for a better kind of conduct? Moreover, even after a plan of action has been fixed on, we are still able, as experience demonstrates, to follow it out in detail, or change it, or abandon it altogether. Such, in fact, is the infirmity of our wills that we do not always elect the type of behavior which is conducive to our goal of ultimate happiness, or to union with the good that is universal and supreme.

5. *Freedom and Inductive Studies*

From an experimental standpoint, neither physical nor biological forces have ever been shown to have a share in "the mental transition . . . from the recognized value to the volitional movements which attain the value,"—as Lindworsky pictures the process of choice. Nor, for that matter, has psychological compulsion been revealed in any of the laboratory studies made on the will-act. Such a thing could happen only if optimum values compelled us to choose. But it is obvious to the layman as well as the scientist, that goods of lesser importance may awaken the desires of our intellectual appetite. With things of equal value, we may be conscious of indifference; but always some motive can be created for the selection of one in preference to the other. Even when only a single value is presented, and choice between alternatives is no longer possible, it does not follow that we are compelled to act, since a resourceful memory or imagination can always put another good alongside the one that is actually presented, so that the conditions of true choice are realized. On the other hand, if the revival of imagery is hindered, or if we have little experience in the art of nonchoosing, our freedom may be appreciably limited. The truth is that we

are not nearly as free in our ordinary choices, or in the practical conduct of our lives, as we may think. Thus, many of the decisions we reach, or the selections we make, are the result of custom and habit; of feelings and associations; of training and background; even of temperament, nerves, and the general condition of the body. One's standards of morality, too, are sometimes cited as curtailments of freedom; but here the limiting of choice is more apparent than real. Moreover, as St. Thomas very wisely remarks, conforming to the rules of right reason is really an enlargement of liberty; whereas falling away from such rules is always in the nature of license. Moral transgressions, in fact, do not pertain to the perfection of freedom, but rather to its imperfection.

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Chapter 36

THE NATURE, ORIGIN AND DESTINY OF THE HUMAN SOUL

1. The Attributes of the Human Soul

In his philosophic analysis of man's soul, St. Thomas pictures it as something essentially immaterial, substantial, and simple. All three attributes are contained, as final implications, in the introspectable data of thought and volition.

I. IMMATERIAL

According to Aquinas, a thing is immaterial when it does not depend on matter for its existence or operations. To establish the fact that the soul of man is matterless, it is enough to show that the products of his mind and will are internally free of the concrete and palpable qualities that mark all the contents of the senses. Thus careful introspection reveals that, although the idea arises from a datum of sense, yet it constantly appears within consciousness as something abstract and impalpable, free of the contingencies of matter, and lifted out of the spatial and temporal contexts that surround our percepts and images.

Furthermore—and here the argument is taken from St. Thomas—we are able to grasp the natures of all bodies. But to know all bodies, intellect cannot have anything bodily in its own nature, since the presence of matter there would prevent its knowing other material things. To illustrate: if the tongue itself had a bitter flavor, then everything else would taste bitter; and it could have no perception of sweet, salty, or sour. "In like manner, if the power of understanding had anything bodily in its nature, it would be unable to grasp the nature of all bodies . . . More than this, it is impossible for intellect to know by means of a bodily organ, since the sensible and determinate nature of the organ would also be an obstacle to any abstract and universal knowledge of the nature of bodies."

To be sure, we must have help from the senses before we can think; and sense powers are necessarily lodged in a body. Still, the dependence of thinking on sensing is no more than extrinsic. As St. Thomas explains: "Mind needs a body, not as the organ by which its thinking is mediated, but simply as a means for bringing it in contact with its object." Moreover, the same independence of matter that we find in our thinking is realized in will and volition, since we can focus on such spiritual goals as justice, unselfishness, and so forth. Then, too, the inherent freedom of will, when brought face to face with particular goods, is proper only to a power that is devoid of matter.

II. SUBSTANTIAL

But if thinking and willing are immaterial acts, they must proceed from powers that are immaterial. Further, powers that have no matter in their nature must be unmixed. That is to say, they cannot be properties of the body since the very presence of matter would hinder their operations. Therefore, thought and volition must be products of the soul which brings them into being by employing its faculties of thinking and willing. But even the most casual observation of these immaterial data shows us that they are accidents, now present, now absent, and constantly shifting from object to object. As accidents, moreover, they must have a subject of inherence—just as color cannot exist except in a body that is colored. This subject, owing to its power of supporting itself, must also be able to support them. Accordingly, the soul of man must be substantial, since the notion of an idea or a choice suspended in a vacuum is impossible.

As St. Thomas sums up the argument: "The principle of intellectual life has a *per se* operation in which the body does not share. But only a thing which subsists is able to function *per se*. Thus, a thing can act only when it has actual being; and its manner of acting follows its manner of being. We do not say, for example, that heat heats; but rather that the thing which is hot causes heat. The conclusion, then, follows: that the human soul, which is sometimes referred to as intellect or mind, is both incorporeal and subsistent." But while anything subsistent is truly in the genus of substance, it need not be "complete in a specific nature," as Aquinas further observes. Actually, the soul of man is only part

of the species which is human nature; and from this point of view, it is something incomplete.

III. SIMPLE

From the philosophic point of view, a thing is said to be simple when it is not composed of separable parts, either essential or quantitative. That the soul is not made up of essential parts is obvious from the fact that it is itself the substantial form of man's nature—a form which, by its union with matter, becomes the principle of man's being. That the soul has no quantitative parts follows from the fact that it is immaterial. Thus, as introspection tells us, a thought or a judgment cannot be sliced into halves, as we divide an apple. It has no arrangement comparable to the extension of protons, atoms, molecules in a given mass of matter, which gives bodies their quantitative aspect. But if the contents of intellect are simple, then so is the power that produces them, and so is the soul in which the power is rooted.

Moreover, intellect can reflect on itself. It is able to know that it knows, and to survey both itself and its act of knowing in a single, complete, and wholly immanent movement. Further, when it reflects thus, it is able to "bend back" its whole self on its whole self —a feat that is plainly impossible in any arrangement of matter, for example, in the extended mass of a sheet of paper. The properties of mind, in fact, are the very converse of those of matter; and the perfection of our power of thinking depends on its ability to free itself of every vestige of the singular and concrete appendages of sense that must always remain such because they are material in nature.

2. *The Nature of the Human Soul*

The soul is not only the subject of our intellectual powers and the source of our thinking and willing; it is also the primary principle by which we live, sense, feel, and move about. "But that by which a thing primarily acts," says St. Thomas, "is its form . . . and since the soul is the first principle of nutrition, sensation, local movement, and understanding . . . therefore it is the substantial form of the body." Moreover, as a substantial form "it is wholly present in the whole body, and wholly present in each part of the body." Its mode of habitation is *not circumscriptive*—as water in a

tumbler, or a hand in a glove—*but definitive,* since its presence is limited by the limits of the body. Its psychosomatic powers, too, which need matter through which to operate, are restricted by bodily organs. In short, though the soul is present everywhere in the body, it does not exercise its properties everywhere. Further, though it virtually contains all the powers of the vegetative and sensitive souls, it is actually a single intellectual soul—comparable, in Aristotle's figure, to a pentagon which contains and exceeds a tetragon—which, in its turn, contains and exceeds a triangle. Finally, the human soul is not the kind of form whose sole task is to inform matter, as is the soul of the animal and plant. On the contrary, the principle of man's being has the perfection of subsistence, since it is neither mixed with matter nor dependent on material organs; so that it is able to both exist and act apart from the body, as we shall presently see.

3. The Relations of Body and Soul

Like every other substantial form, the human soul is immediately conjoined to prime matter; and it is only when their union is complete that we can speak of the body of man and of a body-soul problem. The relation between the two has been variously explained; but the accounts can be summarized under three main headings.

I. MONISM

A monistic theory means, in effect, that there is only one kind of substance: either matter or mind. Thus, materialistic monism makes matter synonymous with all reality; whereas idealistic monism reduces everything to mind and its manifestations. There is a third form—the mind-stuff theory—which attempts to reconcile the foregoing, by saying that matter is only an aspect of mind, and mind only an aspect of matter; so that both, at bottom, are one and the same reality. It is plain that for those who hold views of this sort, there is no body-soul problem. But the recognized existence, in man, of material properties—such as the extension of his senses—on the one side, and of immaterial properties—such as the inextension of his intellect and will—on the other; as well as the irreducible character of the phenomena that arise from these separate powers of human nature, must make monism of any kind an impossible

position. Thus physiological activities, like the assimilation of food particles, breathing, and the flow of blood, have nothing in common with the process of forming an idea; and psychological activities, like comparing ideas, solving a mathematical equation, and resolving to cultivate a virtue, have nothing in common with the reflex movements of the body; so that there is no ground for the identification of matter with mind, or of body with soul.

II. EXTREME DUALISM

According to other theorists, matter and mind, though real, are not internally connected in any way. Whatever relations they have with each other are simply accidental in character. This kind of explanation goes back to Plato, who was the first noteworthy exponent of the doctrine that body and soul are conjoined in much the same manner as a pilot is attached to his ship. Descartes's point of view is no different when he declares that extended matter can have no interaction with inextended mind; and that, therefore, body and soul are not substantially united. The position of modern psychophysical parallelism re-echoes the Platonic and Cartesian idea. As Hans Driesch describes it: the *physical* (in the sense of the mechanical) and the *mental*, are two separated realms of being and operation, unrelated by any causal connection, but corresponding so completely to each other that there is no mental reality without its physical counterpart, and very likely no physical reality without its mental counterpart. St. Thomas's answer to Plato is equally valid against the stand of the Cartesians and parallelists. "It is impossible that one and the same operation should spring from several principles which are different in nature. The functional unity of which I speak here does not refer to the goal of operation, but to the manner in which the operation proceeds from the agent. Thus, several people may be rowing a boat; and the combined efforts of all contribute to the single motion of the boat. Yet, there are as many movements involved as there are strokes of the oars . . . Now, though the mind of man performs certain acts that are wholly immaterial and in which the body has no intrinsic part, his other powers are capable of movements, such as sensations, fear, anger, and the like, the nature of which shows that certain changes have taken place in definite parts of the body. It is the presence of these latter phenomena [at once both psychic

it confers substantial being on the body. In short, a body would not be a body without form; and man's body would not be a human body without his human form. As Aquinas argues: "That whereby the body primarily lives is the soul; and since life appears at different levels by different kinds of operation, that whereby we perform all our vital functions is the soul. Thus, the soul is the first principle of our vegetative, sensitive, and intellectual acts . . . Therefore it is the form of the body." In fact, only on condition of its being united with a body, is it able to expand and perfect its powers. Together with the body it forms the complete substance which is man.

II. SENSATIONS AND EMOTIONS

Certain acts of man are common to body and soul alike, since they involve both material organs and a principle of consciousness. They form the point of departure for St. Thomas's second proof (already used above as part of his argument against the dualism of Plato). Thus, the human soul has certain functions that are properly its own and in which the body is not able to share, such as thinking and willing. But there are also other acts that belong to soul and body together; and these are the fruits of the composite powers. The best examples here are our sensations and emotions which are both psychic and somatic in origin. Yet, in spite of the contrasted elements in its make-up, a sensation or an emotion is a unit of experience. It possesses an attribute of oneness that is impossible to account for, except on the supposition that its principles are somehow one. Hence body and soul, in man, must form a single substance.

III. INTERACTION OF POWERS

Another matter of common experience is the mutual influence that the higher and lower parts of our nature exert on one another. Here St. Thomas's analysis is startlingly modern and realistic. "Because all the powers of the soul are rooted in one essence, and because body and soul form a single composite being, it is natural to find that body and soul are mutually interactive and that the higher and lower powers influence one another. To give a few instances: the apprehensions of the soul may be so violent as to make the body change its temperature, even to the point of producing illness and death. Men have been known to succumb to the excess of

their joys or sorrows or loves . . . On the other hand, the changes that take place in the body react on the soul, and the material complexions of the one are often reproduced immaterially in the other, as in the case where organic disease brings about mental disturbances . . .

"Similarly, the intensity of acts that proceed from the higher powers often has an influence on the lower powers. For example, a strong movement of will is invariably followed by a corresponding movement in sensitive appetite; just as acts of deep contemplation slow down or stop altogether the functions of our animal nature. On the other hand, the intensity of acts produced by the lower powers may exert an effect on the higher. A man's reason, for instance, may be so befogged by the violence of his passions that he judges nothing worthwhile except the satisfaction of his animal appetites."

IV. UNITY OF THE EGO

Should anyone say that the soul of man is not substantially united to his body, he must explain how all his acts—vegetative, sensitive, and intellectual—are attributed to a single subject; as when one says: "I live"; "I sense"; "I think." For surely it would be nonsensical to refer these acts to ourselves—our thoughts and resolutions, our perceptions, emotions, and outer behavior; our eating, drinking, sleeping, and begetting—unless they belonged to us and were inwardly unified by a single principle of operation: the ego. Moreover, all these several activities are clearly pointed towards one goal, which is the perfection of our individual human nature as a whole. But if a body-soul composite is necessary to explain the presence of such functions, then the unity of the latter must mean a substantial unity of the former.

V. REPUGNANCE TO SUFFERING AND DEATH

Man's health and well-being, as St. Thomas observes, depend on the proper subjection of body to soul. Sickness, on the other hand, is a failure to achieve such subjection. Death, of course, is the result of the body's disintegration: a rebellion of matter against spirit which makes further commerce between the two an impossibility. Now, there is nothing that man so naturally desires as health and well-being; nothing he so instinctively shrinks from as suffering and

death. These are things that touch the deepest fibers of his being; and he rebels at the thought that anything should disturb the harmonious interplay of the material and spiritual forces in his nature. But tendencies of this kind have no logical explanation except in terms of a substantial union of body and soul.

5. *The Origin of Man's Soul*

From the many accounts that have been made of the origin of man's soul, four general trends of philosophic theory are indicated.

I. EMERGENT EVOLUTION

According to the teaching of the emergent evolutionists, mind and all its manifestations are simply the outcome of the universal developmental tendencies of matter. But the derivation of an immaterial substance—such as the human soul—from any purely material system, or from an order of being that is intrinsically dependent on matter—such as the plane of vegetative or sensitive life—is out of question because of the inherent lack of balance between effect and cause in a case of this kind. Aquinas's argument is unanswerable: "Although the soul of man has matter for its subject [being united with a body], it is not educed from the potentiality of matter, since its nature is essentially superior to the order of material being. The proof of this statement is in its ability to think. Moreover, as a form, it is self-subsistent and therefore able to go on existing after the body dies."

II. TRADUCIANISTIC THEORIES

Some have maintained that the soul of the child comes from the parents, as the result of either a material or a spiritual generation. Now, the origin of man's form from matter and its potentialities is out of the question, as we have just shown; but what about its emergence from the parental soul? Again impossible, says St. Thomas. For such a position would involve either the dividing of the soul into parts, as a mother cell separates into two daughter cells; or the transformation of the soul of the parent into that of the child. But a matterless substance has neither entitative nor quantitative parts; and once it exists, it cannot lose its being or be changed into something else. On both counts, therefore, the theory of a spiritual generation of man's soul is inadmissible.

III. EMANATION

Before reaching his own solution of the problem, Aquinas presents one more possibility: that the human soul is made of the divine substance. Tracing the history of the theory, he sees its beginnings among those ancient philosophers who, "being unable to rise above their imaginations, supposed that nothing but bodies existed. Therefore they said that God was a body and the principle of all other bodies." Then a further advance was made when some concluded to the existence of an incorporeal element in man's nature, yet inseparable from his body. Thus Varro said: "God is a soul, governing the world by movement and reason"—whence it was inferred that man's form is simply part of that great universal soul, as man himself is part of the universe. But all this is manifestly false since "the human soul, first of all, is in a state of potency with respect to what it can understand; secondly, it acquires its knowledge by abstraction from material things; and thirdly, it is endowed with several powers [each of which is a potency or imperfection in regard to the act that perfects it]. Now, all of these aspects of the soul are incompatible with the divine Nature which is pure act, receives nothing from other things, and admits of no imperfection in itself."

IV. CREATION

Since man's soul cannot be made of matter, or another soul, or the divine substance, then either it is not capable of being made at all; or else it is created. But the first of these two alternatives is untrue, for sound philosophic reasons. Thus, "to be made is the way to existence; and a thing must be brought into being in a way that is suitable to its manner of being. Now, that properly exists which itself has existence, or which is able to subsist in its own existence. Hence, only substances are really and truly called beings . . . whereas accidents are more correctly described as beings of being. The same thing is true of all nonsubsistent forms: in the strict sense of the word, they are not made, but come into being when the composite [of which they are a part] begins to exist. But the soul of man is a subsistent form; and so it can both be and be made." The conclusion, of course, is unavoidable: since it can and does exist, yet cannot be made out of any previously existing sub-

ject, it must come into being from nothingness, by a special act of the Creator.

6. The Time of Origin

I. PRE-EXISTENCE

Some philosophers, notably Plato and his school, have held that the human soul actually antedates the body which it is destined to inhabit. According to St. Thomas, the theory is without foundation, and runs counter to all that we know about man's substantial form. Thus, the very reason of being of a rational soul is to be united with matter. Without the body and its senses, it would be unable to move; and without movement of some sort, its existence would be futile. This inability to operate before union with matter is obvious in the case of the psychosomatic powers which, both objectively and subjectively, depend on material systems. But it is also true in the case of the purely psychic properties of the soul, since ideas are born of experience; and experience is acquired only by contact of the senses with the material qualities of the cosmos. Nor is there any argument from the fact that the soul is able to exist after the disappearance of the body; for then the mind has already laid up a number of ideas on which it can reflect, "not by turning to phantasms, but by a manner of acting that is suited to a soul existing apart from the body." Should death have occurred before reason has unfolded, then understanding will be exercised through ideas infused by the Creator. But there is another serious objection to the theory of pre-existence, since it would imply a defect in the soul from the beginning. Thus, if it had actual being but was unable to operate, its nature would be highly imperfect; and the charge of its imperfection would have to be laid at the door of the Creator, who alone is responsible for its existence—which is manifestly absurd!

II. TRANSMIGRATION

A theory somewhat similar to the preceding holds that the human soul is successively conjoined to several bodies. But to anyone who, with St. Thomas, is philosophically convinced of the essential relation that obtains between body and soul, this kind of view is untenable. According to the teaching of the Angelic Doctor, the matter and form in man's nature actually constitute a single es-

sence. This means that each individual soul is so intimately united with the particular body in which it is enmattered, that it cannot become essentially related to any other body without yielding up something that is part and parcel of its nature. And if the soul does not change its nature, then it is bound to continue this relationship with one body and one only—even after the separation of matter and form in death. The unique character of this bond really works in both directions, since, from the material point of view, the body of man is specifically human because it is linked to a human soul; while from the formal point of view, the human soul is individualized because it is enmattered in a particular body.

III. THEORY OF SUCCESSIVE FORMS

According to Aquinas, the material substrate which eventually becomes a human body by union with a rational soul, is previously informed by a series of less perfect souls. Thus, the fertilized egg first exists as simple vegetative organism, and then as an animal, before it actually becomes a human body by the creation and infusion of the human soul. As the plant form disappears by going back into the potentiality of matter, it is immediately succeeded by an animal form which, in turn, becomes extinct on the advent of the rational form. The main difficulty about the theory of St. Thomas is its failure to account for the epigenetic progression of the fertilized egg towards *human* perfection—a goal, let us note, that is present from the moment of conception. But the existence of such a goal, and the gradual unfolding of the embryo which was potentially human from the start, implies that the powers behind and directing the movements of growth are also human in nature. A further difficulty arises in regard to the origin of the animal soul. In the theory of St. Thomas, it appears as an effect of what he calls a "formative virtue" in the seminal fluid. Such a supposition, however, is unconfirmed by our present day knowledge of the fluid media of gametes. Neither can it be accounted for by the action of the vegetative soul, since the latter, by its natural properties, is confined to the production of vegetative phenomena. A way out of the difficulty is proposed by modifying the teaching of Aquinas to hold that the first soul in the fertilized egg is a sensitive form; so that the body of man is an embryological inheritance from the body of an animal.

IV. THEORY OF ONE FORM

The simplest answer to all the objections that have been raised to the doctrine of Aquinas is to say that the rational soul, and no other form, is present in the organism from the first instant of conception; that is to say, from the moment that the nuclei of sperm and egg fuse and bring into being the zygote. Nor is there anything in this view that runs counter to the principle of proportion, which demands that there be some basic symmetry between matter and form. Thus, as the embryologists themselves declare, the fertilized human ovum has all the potentialities of becoming in time a perfect human body. Its material system, moreover, is the effect of a reproductive act that is human. The fact is, of course, that man is identified as a human being long before he appears in the world where he gradually manifests those properties that are specifically human. We might state this in another way by saying that just as an infant is born a person and does not metamorphose into one, so the fertilized egg, which results from the act of reproduction, is actually a human being and is not, by the stages of gestation and the subsequent appearance of the human of the soul, transformed into one. The embryological growth of man, according to this view has nothing to do with a change in nature, but merely with the step-by-step unfolding of his powers, all of which are present from the beginning, since the rational soul is present from the beginning.

7. *The Destiny of the Human Soul*

The state of the human soul after death has always occupied a central place in philosophic discussions for obvious reasons. Either it dies with the body; or it continues to exist, but in a vague and impersonal way; or its survival, as an individual substance, is unique and personal.

I. EXTINCTION

Down through the ages, one can always find a certain number of material-minded men who have held out against immortality, apparently convinced that when the body disintegrates in death, the soul corrupts and disappears with it. As far back as the time of the Epicureans, this sort of philosophic opinion had attained a well-

systematized form of expression. Indeed, no modern writer on materialism has added any noteworthy argument to the account that Lucretius has given of the soul's ultimate destiny. Committed by implication to a theory of extinction are the views of those who hold, first, that all mental processes are finally explained in terms of physical and chemical events, or as phenomena of a purely mechanical system; secondly, that thought and volition are reducible to sensations, images, feelings, or any other datum of animal life; thirdly, that intellectual consciousness is the product of the general emergent tendencies of nature. For, it is plain that whatever can be interpreted in terms of mechanics, or whatever is confined within the limits of the particular and concrete, is material in character, and must therefore be subject to the same laws of disintegration as control all matter.

II. IMPERSONAL SURVIVAL

Some philosophers, imbued with a pantheistic outlook, have insisted that the final goal of the human soul is absorption into a conscious or unconscious absolute, in which it loses its own identity. This point of view is common in oriental religions, particularly among the followers of Buddha. The core of the system is the principle of *nirvana* or release from suffering and mortality. There is some dispute among the scholars about the exact nature of nirvana, and whether it involves an extinction of consciousness; but even if it survives, it does not seem to be personal in nature. In any case, as far as man's soul is concerned, Buddhism gives no guarantee of permanent individual existence.

III. PERSONAL SURVIVAL

Firmly opposed to all theories of the kind we have just described is the well-reasoned position of St. Thomas, who declares that the soul of man is naturally incapable of destruction. Moreover, since it is an individual form, it must continue to exist as such; not, of course, as a person, since only the composition of body and soul has the nature of a species, but with a subsistence that is separate and individual and hence of a personal character.

Ontological proof. The soul is an immaterial substance. Thus, while the exercise of intellect and will is objectively conditioned by the data of sense, yet thought and volition in themselves are

abstract and immaterial contents, and as such, intrinsically free of the appendages of sense. The soul, therefore, has certain activities in which neither the body nor its organs have any share. But if intellect and will, absolutely speaking, do not need matter in order to think and resolve, then the human soul, in which they are rooted, does not, absolutely speaking, require matter in order to exist. Moreover, as a matterless substance, man's soul has no entitative or quantitative parts. So it is lacking in elements whose separation would entail its corruption: as water, for example, is destroyed by resolving it back into hydrogen and oxygen; or as man himself is destroyed, by the withdrawal of the soul from the body. Hence, the conclusion of Aquinas: that neither by the corruption of itself, nor by the decay of the body of which it is intrinsically independent, is the soul of man able to lose its existence.

The same inference is reached from a consideration of the designs of the Creator, Who is both efficient and final cause of man's soul. Thus, while annihilation is not impossible, it is excluded by the essential wisdom of God, Who made the human form immortal by its very nature. Further, any suggestion of this kind is particularly repugnant to the scientific mentality which is committed, by all its training and background, to the principle of inviolability as far as the laws of nature are concerned. To deprive man's soul of life, therefore, would be inconsistent with both human logic and divine understanding.

Psychological proof. The final goal of intellect is to know absolute truth; just as the goal of will is to possess supreme good. Yet, attainment of such ends is obviously impossible under the imperfect conditions of this life. Hence, the soul must be capable of perpetual existence, since without immortality it would be impossible to satisfy the natural inclination of its powers. As St. Thomas sums up the argument: "In things that have knowledge, the nature of appetition follows the nature of cognition. Now, the senses apprehend objects under the conditions of here and now; whereas intellect seizes on essences in a manner that is absolute and independent of the limits of time. Hence, whatever has intellect naturally desires to live forever. But, a natural desire cannot be in vain. Therefore, the intellectual substance is incorruptible."

Moral proof. The moral argument is not developed in the writings of Aquinas; but it is implied in his teaching on the nature of moral

erties. And this demand, it should be noted, is in the nature of the soul. Secondly, the body is the helpmate of the soul and a co-operator in all its behavior. It should participate, then, in the latter's future joys or sufferings, according to the nature of its conduct on earth. Finally, body and soul are both necessary to the essence of man; and man, as St. Thomas just told us, is the natural link between matter and spirit. But this link would be absent, and a rung would be missing on the ladder of being, were there no future rejoining of body and soul. There are good philosophic reasons, then, for the prediction that at some future time man will reappear, whole and entire, with the material and immaterial elements in his nature wedded together again in a substantial union.

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Because of their importance for his psychology, I should like to call attention to the following texts among the writings of St. Thomas:

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   C. Treatise on Habits: p. I–II, qq. 49–61.
2. *Against the Gentiles* (*Summa contra Gentiles*), translated by the English Dominicans. London: Burns Oates & Washbourne, 1923–29, 5 volumes.
   A. Intellectual Substances: b. I, cc. 46–55.
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   C. Nature of the Soul: b. I, cc. 58–90.
3. *On the Soul* (*De Anima*), translated by J. P. Rowan, under the title *The Soul.* St. Louis: Herder, 1949.
4. *Commentary on Aristotle's Treatise On the Soul* (*In Aristotelis De Anima*), translated by K. Foster, O.P., and S. Humphries, O.P., under the title *Aristotle's De Anima in the Version of William of Moerbeke and the Commentary of S. Thomas Aquinas.* London: Routledge & Kegan Paul, 1951.
5. *On Truth* (*De Veritate*), translated by R. W. Mulligan, S.J., J. V. McGlynn, S.J., and R. Schmidt, S.J., under the title *Truth.* Chicago: Regnery, 1952–53, 3 volumes.
   A. Nature of Truth: q. 1.
   B. Will and Free Will: qq. 22 and 24.
   C. Sensuality and the Passions: qq. 25 and 26.
6. *Exposition of the Book of Boethius On the Trinity* (*Expositio Libri Boetii De Trinitate*), translated by Sr. R. E. Brennan, S.H.N., under the title *The Trinity.* St. Louis: Herder, 1946.
   A. Degrees of Knowledge: q. 5.
   B. Modes of Knowledge: q. 6.

7. *On the Unity of Intellect* (*De Unitate Intellectus, contra Averroistas Parienses*), translated by Sr. R. E. Brennan, S.H.N., under the title *The Unicity of Intellect*. St. Louis: Herder, 1946. This and the preceding title are published as one volume.
8. *On the Virtues in General* (*De Virtutibus in Communi*), translated by J. P Reid, O.P., under the title *St. Thomas on the Virtues* (*in General*). Providence: Providence College Press, 1951.
9. *On the Power of God* (*De Potentia Dei*), translated by the English Dominicans. London: Burns Oates & Washburn, 1932–34, 3 volumes. This vork is now published in one volume by Newman Press: Westminster, Md.
10. *On Spiritual Creatures* (*De Creaturis Spiritualibus*), translated by M. C. Fitzpatrick and J. J. Wellmuth, S. J. Milwaukee: Marquette Universitv Press, 1949.
11. *In Aristotelis De Memoria et Reminiscentia*. This is one of a series of short physical treatises, called the *Parva Naturalia*, written by Aristotle and commented on by St. Thomas. They are of great interest to the psychologist.
12. *Compendium of Theology* (*Compendium Theologiae*), translated by C. Vollert, S.J. St. Louis: Herder, 1948.
    A. Intellectual Substances: cc. 74–77.
    B. Intellectual Faculties and Operations: cc. 78–89.
    C. Oneness of Soul: cc. 90–92.
    D. Production of Soul: cc. 93–95.
13. *De Potentiis Animae*. This is not usually ranked among the actual writings of St. Thomas. Yet it is very authentic in doctrine, and a splendid summary of his views on certain psychological problems. It is thought to have been composed by a student who sat in the class of Aquinas and took down notes from the lectures of his teacher. Very likely it was looked over and approved as genuine by St. Thomas himself. It is edited by P. Mandonnet, O.P., in his S. *Thomae Aquinatis Opuscula Varia*. Paris: Lethielleux, 1927.

Abbreviations

To simplify references to the foregoing texts of Aquinas, the following abbreviations are used in the bibliography:

ST = *Sum of Theology*
AG = *Against the Gentiles*
OS = *On the Soul*
COS = *Commentary on Aristotle's Treatise On the Soul*
OT = *On Truth*
EOT = *Exposition of the Book of Boethius On the Trinity*
OUI = *On the Unity of Intellect*
OVG = *On the Virtues in General*
OPG = *On the Power of God*
OSC = *On Spiritual Creatures*

IDM = *In Aristotelis De Memoria et Reminiscentia*
CT = *Compendium of Theology*
DPA = *De Potentiis Animae*

Further Abbreviations

a. = article
b. = book
c. = chapter
d. = distinction
in = commentary on (for example: *In Aristotelis De Memoria,* etc.)
lect. = lecture
n. = number
obj. = objection
p. = part (when used with capitalized Roman numerals; otherwise p = page)
q. = question
r. = reply
t. = treatise
vol. = volume

A Note on Translations

All the English translations of St. Thomas and Aristotle that appear in *General Psychology* are my own. They do not differ, in substance, from the other English translations that have been recommended to the student both in the suggested readings and at the beginning of this bibliographical section. There are some accidental variations, however, that seem to me to be in the nature of an improvement. Thus, I have allowed myself more freedom than the literal translator, so as to get good idiomatic expression of the ideas behind the language of Aquinas and the Stagirite. All the while I have tried to be faithful to their respective systems (which are basically one), and to say no more and no less than what I think was meant to be said in the original texts. My best guarantee that St. Thomas (and Aristotle, too, perhaps) would have no objection to this method of modernizing their thought is the statement of the Angelic Doctor himself, in the introduction to his *Contra Errores Graecorum:* "It is the business of the good translator to preserve the meaning [of the original] and, at the same time, to adapt his language to the idiom of the tongue into which he is translating." As for the Stagirite and his intricate Greek, I cannot conceal the fact that my interpretation of him is definitely *ad mentem divi Thomae* who, by the testimony of impartial scholars, came as close as anybody to understanding the mind of the great pagan philosopher.

REFERENCES AND NOTES

Chapter 1 THE PSYCHOLOGY OF THOMAS AQUINAS

PAGE	LINE [1]	
1	2	A system, in philosophy, is a methodically arranged set of ideas or principles. It is not necessarily true; but it has a cohesion and a logical arrangement that makes it stand out as an integral whole. As I shall point out on a later page of this chapter, St. Thomas's system of philosophy is a real *totum organicum;* and part of that system is his psychology, which shares in the truth and harmonious beauty of the whole. The proper comparison of his philosophy, therefore, is to that kind of system which we call an *organism:* that is, something knit together from many parts and brought into unity by a single living principle which gives it its capacity to assimilate new ideas, to grow and adjust itself to changing circumstances of time and place; in short, to be *vital* and *vitally conscious* of new facts and discoveries that have a meaning for its development. For an analysis of the position that St. Thomas's philosophic system enjoys among Christian thinkers, see S. Ramirez, O.P. The Authority of St. Thomas. *The Thomist,* Jan. 1952, pp. 1–109.
2	1	St. Thomas Aquinas was born at the end of 1224 or the beginning of 1225. He entered the Dominican Order in 1244, studied under St. Albert the Great at Cologne and Paris, began his teaching career at the University of Paris in 1252, where he continued to lecture until 1259. The greater part of the next decade was spent in Italy. His second sojourn in Paris, from 1269 to 1272, marks the period of his highest literary output. He died at 49, in 1274.
2	13–17	*In Aristotelis De Caelo:* b. II, lect. 17. See also: *EOT:* q. 6, a. 1.

[1] Captions and diagrams are not counted in reckoning the lines of the text.

PAGE	LINE	
2	20–24	Eddington, A. S. *The Nature of the Physical World.* N.Y.: Macmillan, 1928, p. 337.
2	27–31	*On the Generation of Animals:* b. III, c. 10.
3	3	St. Albert the Great was born in 1206 and entered the Dominican Order in 1223. He taught at Paris and Cologne between 1245 and 1254, became bishop of Ratisbon in 1260, resigned this office two years later, and again took up active teaching until forced to retire because of old age. He died in 1280. Like St. Thomas, he was a prodigious writer. St. Albert is venerated as the patron of scientists; just as St. Thomas is regarded as the patron of philosophers and theologians.
3	7–9	*Mineralia:* b. II, t. 2, c. 1.
3	10–11	*Parva Naturalia,* De Vegetabilibus: b. VI, t. 1, c. 1.
3	15–22	Chesterton, G. K. *St. Thomas Aquinas.* N.Y.: Sheed & Ward, 1933, p. 99.
3	32–35	*Metaphysics:* b. III, c. 1.
3	35–	
4	–8	*In Aristotelis Metaphysica:* b. III, lect. 1.
4	18–20	*EOT:* q. 6, a. 1, response to third part.
4	35–36	"One must first know the method of procedure for a given science before he learns the science itself." (*EOT:* q. 6, a. 1, obj. to second part, r. 3.)
5	5–8	*Epistola ad Joannem de Modo Studendi.* See also: Aristotle, *Physics:* b. I, c. 1.
5	8–16	Garrigou-Lagrange, R., O.P. *De Methodo Sancti Thomae.* Roma: Schola Typographica "Pio X," 1928, pp. 19 ff.
6	27–32	*ST:* p. I–II, q. 112, a. 5, r. to obj. 1.
7	12–17	Külpe, O. *Outlines of Psychology.* Trans. by E. B. Titchener. N.Y.: Macmillan, 1895, p. 10.
8	21–25	Aveling, F. Emotion, Conation, and Will. *Feelings and Emotions.* Edited by C. Murchison. Worcester: Clark University Press, 1928, p. 52. See also: Spearman, C. *The Abilities of Man.* N.Y.: Macmillan, 1927, pp. 98 ff.
10	11-16	One of the most difficult problems in the psychology of St. Thomas is the relation of man's will to the sovereign will of God. Properly speaking, it is a problem for theology. Yet, because it is always at the back of our thoughts when we are studying the will-act, I append here the classical text (*ST:* p. I–II, q 10, a. 4) where Aquinas gives us his answer: "As Dionysius says (in his treatise *On the Divine Names,* IV): 'It is not in the plan of God's providence to destroy the nature of things, but rather to keep them intact.' Hence, He moves everything according to the conditions of its being.

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This He does in such wise that, under the influence of His divine action, effects flow necessarily from necessary causes; whereas the effects of free agents are freely produced. Now since the will of man is an active agent, not determined to one thing but having a relation of indifference to many, God must move it in such a manner that He does not determine it to one thing of necessity. Far from being forced, then, the movement of the will remains free—the only exception being where it is moved by its nature."

Perhaps we should explain here that will is "moved by its nature" when it is inclined to good in general. In the presence of such an object, which exhausts the mind's conception of goodness, there is nothing will can do but desire it. Rehearsing the foregoing points in his reply to objection 1 of the same article, St. Thomas observes that God's will extends not only to the doing of a thing but also to the manner in which it is done: containing in a single embrace both the substance and the mode of every creature action. Only on this condition is His own infinite nature respected: when He respects the finite natures of the things He has made. Hence, it would be utterly loathsome to Him not to move free men freely, or not to allow them a hand in making their own decisions, when freedom is a quality rooted in their very nature as rational beings. See also:

OPG: q. 3, a. 7, and obj. 12 and 13.

10 | 26–27 | *Metaphysics:* b. XII, c. 7.

11 | 3–9 | *On Generation and Corruption:* b. I, c. 2.

11 | 10–24 | It would be a serious mistake in perspective to think that St. Thomas contented himself simply with "baptizing Aristotle," as the saying goes. The fact is, he gave new life and organization to the whole Aristotelian system of thought: re-evaluating the old pagan's philosophy from end to end, and bringing it more explicitly under the single unifying principle of being. Aristotle reached the peak of his metaphysical survey of reality in his portrayal of God as First Act, infinitely pure, radiant, living, good, and eternal; and since such an Act is utterly without limitations, it must include, as fundamental to everything, the perfection of infinite existence. Aristotle, in fact, is the greatest of the pagan "existentialists." St. Thomas's conception of "being," and especially of the "infinite being of the First Act," is essentially the same as Aristotle's; but it is a greater clarification of the latter's teaching, presenting a more satisfactory analysis of the attributes of God and developing, in a positive way, the notion of an infinite providence, exercised over every detail of the

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		rightly described as perennial. Its value exceeds the "historical moment" in which it was conceived and brought forth. It is not a museum piece but a vital force that can influence the thinking of men for all times.
		Chapter 2 THE NOTION OF GENERAL PSYCHOLOGY
15	17–21	*ST:* p. I, q. 77, a. 3, *sed contra.* See also: *COS:* b. II, lect. 6. Here St. Thomas, following Aristotle, says that acts are properly known by studying their *objects;* powers, by studying their *acts;* and the soul or besouled organism, by studying its *powers.* It is hardly necessary to add that any one who is faithful to a method of this kind is bound to produce an *objective psychology,* in the best sense of the term.
15	22–24	*On the Soul:* b. II, c. 4. *Metaphysics:* b. V, c. 4.
17	21–23	*ST:* p. I–II, q. 57, a. 2.
17	24–36	The classic treatment of the degrees of abstraction is found in St. Thomas's *Exposition of the Book of Boethius On the Trinity* (*EOT*): qq. 5 and 6. Here Aquinas studies in detail the roots of the threefold division of philosophy which I have given in the text, as well as the methods of research that are proper to each division. I have made constant use of the teaching of these two questions in trying to formulate the relationship between modern science and the philosophy of the Angelic Doctor.
18	36–	
19	–36	Maritain, J. *The Degrees of Knowledge.* Trans. by B. Wall and M. R. Adamson. N.Y.: Scribners, 1938, c. 1. In setting up a contrast between science and philosophy, it must always be remembered that philosophy is also a science. Philosophy, indeed, is a much more perfect species of knowledge than what we call modern science. The reason is simple: science, in its philosophic sense, is *certain* knowledge, acquired by demonstration from principles that are either immediately or mediately evident; science, in its modern positive or scientific sense, is only *probable* knowledge, derived from principles that are no more than plausibly true, as Eddington pointed out in the first chapter of our text (page 2).
20	15–17	To give an example of the difference between the material and formal objects of our knowledge: several men are interested in the same piece of land. One sees its possibilities as a farm; another, as a flower garden; another, as a source of coal or oil. The first is looking at it as an agriculturalist;

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the second, as a horticulturalist; the third, as a mineralogist. So with the scientist and the philosopher who make man the object of their research. Both are dealing with the same thing, materially speaking; but each has his own approach and his own goal. The term of their respective knowledges, formally speaking, is different; and this makes for a formal or specific difference in the knowledges themselves.

20 18–20 *EOT:* lect. 2, inserted between qq. 4 and 5.

20 30–34 Common observation is enough as a point of departure for philosophic speculation; but this does not mean that philosophy is limited, in method, to common observation. There is nothing to prohibit the philosopher from starting his inquiry from the data of experience revealed by the scientist. Moreover, the method of philosophy must be adequate enough to carry the mind through, from its initial observation, to a knowledge of the nature or principle that is behind the fact of observation. The complexity of the philosophic method is seen to good advantage in Aristotle's *Physics:* b. II, where he indicates the way in which our research into the order of natural being must proceed.

21 7 The formal distinction between science and philosophy is defended by Jacques Maritain (*Degrees of Knowledge:* pp. 58–63) and Mortimer Adler (*What Man Has Made of Man.* N.Y.: Longmans, Green, 1937, pp. 131–39). According to this point of view, the two species of knowledge are said to be operative at the same level of thought which is the first degree of abstraction. This is the level where the object is considered without its individuating notes, that is to say, without those marks that identify it as a singular thing; where, in short, it is looked at simply as subject to physical change.

On the other hand, we find Thomists like Reginald Garrigou-Lagrange, O.P. and Santiago Ramirez, O.P., who insist that there is no formal distinction between science and philosophy. They argue that it is the same kind of knowledge which grasps the substance of a thing and its accidents. Substance, in fact, is made manifest to our minds only through accidents. Hence, in seeking to get a firmer grasp on the notion of substance, we must use every available means to understand its properties and how it acts—inductive and deductive reasoning; observation with the naked senses, and observation refined by tools; and so forth—all the while remaining within the first degree of abstraction and therefore within range of one and the same species of knowledge. From this point of view, psychology would unite the results

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of both philosophic analysis and scientific research in one continuous doctrine, which is simply the study of man. For a clear account of the position that science and philosophy form a single species of knowledge, see A. Fernández-Alonso, O.P. Scientiae et Philosophia secundum S. Albertum Magnum. *Angelicum*, 1936, pp. 24–59.

22 8–11 *EOT:* q. 5, a. 1, r. to obj. 5.

22 14–30 The following diagram is a summary of the main points we have made in our text on the distinction of our knowledges of psychology:

	SCIENCE	PHILOSOPHY
material object	man——→*as a sensible being*←——man	
formal object	accidents or properties or phenomenal aspects laws of operation or proximate causes	substance or nature or ontal aspects laws of being or ultimate causes
method	experimental and clinical	experiential

As our diagram indicates, both the science and the philosophy of human nature have the same material object, which is man in his sensible aspects. This may be expressed in another way by saying that both have an identical *subject*, since it is one and the same determined being, man, about whom knowledge is sought by the scientist and the philosopher. For a further development of the idea of material object as subject, see:

Maritain, J. *Existence and the Existent*. Trans. by L. Galantiere and G. B. Phelan. N.Y.: Pantheon, 1948, p. 14.

23 4–7 Here I should like to point out that what modern science calls a "property," may or may not be essential to the thing in which it inheres. It belongs to the philosopher, precisely as philosopher, to tell whether any given attribute or characteristic is simply an accident and non-essential; or a property, in the strict sense of the term, and therefore essential. Further, when the philosopher arrives at a knowledge of the nature of anything, he has reached that ontological reality which is the source and basic reason of the properties. Thus

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man's nature, being intellectual, is the cause of his having the power or property of intellect.

23 | 16 — All that I have said about psychology as a science is true in a theoretic way; but whether, in actual practice, it can ever become strictly scientific, is open to debate. Certainly the behavior of man, as a creature endowed with freedom, cannot be subject to rigid prediction. The material part of his nature is the only element in his make-up that is open to quantitative measurement. Even here, because his body is besouled, it does not yield itself to experimental conditions as readily as lifeless matter; and how much less so in view of the fact that his soul is rational, thereby conferring on his body a unique and personal value that must always be respected! Moreover, because his spiritual or unmixed properties (mind and will) have no matter in their nature, they are not as amenable to the techniques of the laboratory as his mixed powers (the senses) that depend on body and soul for their operations. Hence by a sort of paradox it would appear that the closer psychology approximates to the stature of a strict science, the less genuine psychology there will be in it, and the more it will be ruled by the concepts of physics and physiology.

23 | 17–
24 | –17 — The description of general psychology which I have given in the text may be resolved thus: the study of man (genus), terminating in two kinds of knowledge: first, of the acts and properties of man (one species: the science of human nature); secondly, of the essence of man (another species: the philosophy of human nature). The genus here is the same since the material object, or the subject matter with which general psychology deals, is man. The genus is shared by two species of knowledge, resulting from two kinds of ultimate difference: the formal object of science giving rise to one species; that of philosophy, to another.

24 | 18–
25 | –16 — *COS:* b. I, lect. 1.

26 | 19 — Before closing this chapter, a word about the so-called division of psychology into *rational* and *empirical* will not be amiss. It is one of the worst confusions ever inflicted on the mind of the student who usually understands it as tantamount to the division of psychology into *scientific* and *philosophic*. Now, surely it is not this! The word "empirical" means a form of knowledge that is derived from the senses, whether aided or unaided by tools. "Rational," on the other hand, refers to what is possessed of reason or known by reason.

An empirical datum, therefore, is properly the product of the senses; while a rational datum is the result of reflection. From this point of view, it is plain that the science of psychology is rational as well as empirical, since it reflects on its data; and that the philosophy of psychology is empirical as well as rational, since it starts with the experience of the senses.

The division into empirical and rational psychology goes back to Christian von Wolff. Among other disorders caused by this philosopher was his habit of regarding psychology as part of metaphysics—against all the genuine Aristotelian and Thomistic traditions about the way philosophy should be divided. I have tried to show in the text where St. Thomas puts it: as part of the philosophy of nature. True, he would allow that the soul, as a separated substance, is an object of metaphysics, just as knowledge of God, the angels, and all matterless beings is metaphysical; but this is not the way we study it in psychology. On the contrary, as an object of psychological knowledge, the soul is always considered *as a form conjoined to matter;* in short, as the form of man. The only good I can discern in the division of psychology into empirical and rational flows from its inadequacy and misleading character. Like a heresy that helps to bring the truths of faith into clearer perspective, this false way of looking at the study of man makes it necessary to stress, first, just how the soul is analyzed in psychology: as a form of matter (though in man's case, able to subsist without matter); secondly, just where psychology belongs in the family of philosophic knowledges: as part of the Aristotelian physics, that is, the philosophy of nature. See:

Adler, M. J. *What Man Has Made of Man.* N.Y.: Longmans, Green, 1937, pp. 196–99.

Brennan, R. E., O.P. The Mansions of Thomistic Philosophy. *The Thomist,* April, 1939, pp. 62–79.

Chapter 3 THE NOTION OF ORGANIC LIFE

PAGE	LINE	
29	9	*On the Soul:* b. II, c. 4.
29	19–23	*AG:* b. I, c. 97.
30	18–	
32	–37	Carrel, A. *Man the Unknown.* London: Hamilton, 1935, c. 3.
		Eulenburg-Wiener, R. von. *Fearfully and Wonderfully Made.* N.Y.: Macmillan, 1939, c. 1.
33	19–	
34	–5	Hopkins, F. G. Some Chemical Aspects of Life. *Science,* Sept. 1933, pp. 219–31.

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37	3	Even in virgin-birth, where females are produced from unfertilized eggs, males are eventually begotten; and then bisexual reproduction is resumed. Virgin-birth, therefore, is simply a modification of the ordinary method of generating by the union of sperm and egg.
38 39	19– –22	Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 85–99.

Chapter 4 THE DOCTRINE OF MATTER AND FORM

PAGE	LINE	
40	15	It may be well to recall here certain ideas that are intimately connected with the Aristotelian teaching on matter and form. Let me summarize them thus: *substance:* something that can exist by itself; *accident:* something that needs a subject in which to inhere; *nature:* the ground principle by which a substance acts; *property:* the proximate principle or power by which a nature acts; *essence:* that whereby a thing is constituted in a determinate species, or that which corresponds to the strict definition of a thing. The essence of corporeal creatures is composed of matter and form; that is, of prime matter and substantial form. Note, moreover, that the substance of a thing is its very *being;* whereas its accidents are only *beings of being.* Further, all the properties or powers of a substance are accidents, though not all accidents are powers or properties. Finally, *form* is sometimes identified with *essence,* in which case it means the *form of the whole* or the total essence, and not the *form of the part* which is only a portion of the essence (the other portion being matter). For St. Thomas's delineation of these various ideas, see: *On Being and Essence* (as below): cc. 1 and 2.
40 41	16– –18	In the language of Aquinas, local change is called *latio* or locomotion; qualitative change, *alteratio* or alteration; quantitative change, *augmentatio* and *diminutio* or growth and shrinkage; and substantial change, *generatio* and *corruptio* or generation and corruption.
42	17	While it is true that a thing either is or is not, it is also true that a thing can be in the process of *becoming* something else. Water, for example, can be gradually changed into wine. This kind of movement involves a whole series of generations and corruptions. But at any given point in the series, there is no moment when matter is without form; in short, when a thing is not a thing. For, in the very instant that matter loses one form, it acquires another. In fact, the

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		appearance of the new form is the reason of the old form's disappearance, according to Aristotle's dictum: the generation of one thing means the corruption of another. Notice, moreover, that it is the supposit or whole thing (not matter or form, taken singly) which is the goal of generation and corruption.
43	4	Matter makes possible the multiplying of the same kind of substantial form in many individuals; for example, many men with the same kind of rational soul. For St. Thomas, the roots of the individuating process are *materia quantitate signata:* matter earmarked by quantity.
44	3	It is apparent from what we have said in the text that Aristotle's view of physical bodies is a philosophic one. It comprises the notion of both substance (first matter and first form in union, making something that can exist by itself) and accidents (secondary forms that always need a subject of inherence). It is aimed at a knowledge of the inner nature of corporeal things. The scientific view of physical bodies, on the other hand, like all else that is included in the goal of modern science, does not go beyond a knowledge of the properties, structure, and behavior of matter. Hence the scientist speaks of matter as made up of a system of minute particles (protons, electrons, and so forth), combined in various ways, and enriched with huge stores of energy which it uses as its system allows. But he does not venture an opinion about the inner nature of matter except to say that, for him, it is unknown.
45	4	For Aristotle's teaching on matter and form, see: *Physics:* bb. I–VIII. *On the Heavens:* bb. III–IV. *On Generation and Corruption:* bb. I–II. *Metaphysics:* bb. V–X. For St. Thomas's teaching, see: *Commentary on Aristotle's Physics* (*In Aristotelis Physica*): books I and II. Trans. by R. A. Kocourek. St. Paul, Minn.: North Central Publishing Co., revised edition, 1951. *On Being and Essence* (*De Ente et Essentia*). Trans. by A. Maurer, C.S.B. Toronto: Pontifical Institute of Mediaeval Studies, 1949, cc. 1, 2, 5, 6. *On the Principles of Nature* (*De Principiis Naturae*). Trans. by R. A. Kocourek. St. Paul, Minn.: North Central Publishing Co., revised edition, 1951. (This piece, and the *Commentary on Aristotle's Physics* noted above, are published under the single title *An Introduction to the Philosophy of Nature.*) *OSC:* a. 1.

Chapter 5 THE NATURE OF ORGANIC LIFE

PAGE	LINE	
46	1–16	*ST:* p. I, q. 78, a. 2. *COS:* b. II, lect. 7–9.
46	19–20	*AG:* b. II, c. 91.
46 47	21– –12	*AG:* b. IV, c. 11. *ST:* p. I, q. 18, a. 2; q. 78, aa. 1 and 2. *OT:* q. 4, a. 8.
47	23	Because protoplasm is an organized system, it is commonly referred to in terms of a *machine*. The eye, ear, and whole body of man are often described as mechanisms of varying delicacy. There is no quarrel here, provided we understand what is meant by such descriptions. Every machine is an organized system. Its parts are so inter-related that the whole, as a cause, is adapted to the attainment of certain ends, as effects. This conception may be applied equally well to a universe or an amoeba—but with a difference, of course! The physical universe is a purely mechanical system, operating according to the laws of external design. The amoeba, on the other hand, represents a special organization of matter which is controlled in its functions by the laws of internal design. The same thing is true of the human body, which is much more complex than that of the amoeba. For a further development of this interesting comparison, see: Carrel, A. *Man the Unknown.* London: Hamilton, 1935, p. 106.
47 48	32– –10	Le Dantec, F. *The Nature and Origin of Life.* Trans. by S. Dewey. London: Hodder and Stoughton, 1907. Darwin, C. *The Origin of Species. The Descent of Man.* N.Y.: Cerf and Klopfer, The Modern Library Series. Huxley, T. H. *Darwiniana.* London: Macmillan, 1907. Haeckel, E. *The Riddle of the Universe.* Trans. by J. McCabe. London: Watts, 1899. Haldane, J. B. S. *The Causes of Evolution.* London: Longmans, Green, 2nd edition, 1935.
48	11–25	Morgan, C. Lloyd. *Life, Mind and Spirit.* London: Williams and Norgate, 1926.
48	26–33	Bergson, H. *Creative Evolution.* Trans. by A. Mitchell. N.Y.: Holt, 1911. Alexander, S. *Space, Time and Deity.* London: Macmillan, 1920, 2 volumes. Smuts, J. C. *Holism and Evolution.* N.Y.: Macmillan, 1926. Whitehead, A. N. *Process and Reality.* N.Y.: Macmillan, 1929.

PAGE	LINE	
48	33–	
49	–4	McDougall, W. *Modern Materialism and Emergent Evolution.* N.Y.: Van Nostrand, 1929.
49	5–12	Hauber, U. A. The Mechanistic Conception of Life. *New Scholasticism,* July, 1933, pp. 187–200.
50	8–12	Mercier, D. *A Manual of Modern Scholastic Philosophy.* Trans. by T. L. and S. A. Parker. St. Louis: Herder, 1919, vol. I, p. 169. St. Thomas (*ST:* p. I, q. 78, a. 2, r. to obj. 1) says much the same thing when he notes that vital powers are called natural because they produce effects like those of nonliving matter. Thus, the former actually employ the physical and chemical energies of nature as tools for the achievement of their vital responses.
50	28–33	*ST:* p. I, q. 18, a. 3, r. to obj. 1.
51	17	Some scientists, for example, J. Needham (*The Sceptical Biologist.* N.Y.: Norton, 1930) and E. B. Wilson (*The Cell in Heredity and Environment.* N.Y.: Macmillan, 3rd edition, 1934) propose mechanism simply as a fiction, proceeding in their studies *as if* the theory were true. This is supposed to accord better with the spirit of modern scientific enquiry. But is it not also an abandonment of the problem of life? Moreover, if the investigator confines himself solely to the physical and chemical aspects of protoplasm, is he not likely to end up by losing sight of the unity and coordinated behavior of the organism as a whole? On the other hand, those who express a distaste for such a fiction do not necessarily commit themselves to a vitalistic interpretation of life. J. B. S. Haldane, for instance (*op. cit.:* c. 5), would include the properties of protoplasm within the limits of a physico-chemical system, describing such properties as material rather than mechanical. Thus, while rejecting the methodological fiction, he is just as vehement in his denial of any vitalistic agent in the organism, to account for its peculiar powers. (Haldane's controversy with Arnold Lunn on the merits of mechanism versus vitalism is found in the latter's *Science and the Supernatural.* N.Y.: Sheed and Ward, 1935.) Maritain hints at a more moderate outlook in scientific circles when he says: "Biologists today are beginning to realize that while giving an ever larger space to the physico-chemical and energetic analysis of living phenomena, biology can only rightly progress by expressly breaking with the mechanistic theory." See: Maritain, J. *The Degrees of Knowledge.* Trans. by B. Wall and M. R. Adamson. N.Y.: Scribners, 1938, p. 240.

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physical and chemical description of the respiratory movements of the body can give no idea of the elaborate balance, harmony, and development of widespread areas of coordination that the act of breathing really entails. See:

Haldane, J. S. *Respiration.* New Haven: Yale University Press, preface to the 2nd edition, 1935, pp. v–vi. (J. S. Haldane is not to be confused with J. B. S. Haldane, referred to in a previous chapter.)

57 25 After a careful survey of all the important researches in the field of physiology, McDougall concludes that no organic function can be explained solely on physico-chemical principles; that in every vital process there is manifested a "power of selection, of regulation, of restitution, or of synthesis" that eludes any attempt to account for it mechanically. Maritain pushes his observations to the very roots of the problem when he notes that while the organism works by means of physico-chemical energies, it also gives token of possessing a principle of immanence which is able to use these mechanical forces in a manner that is wholly superior to the dynamics of non-living bodies. See:

McDougall, W. *Body and Mind.* N.Y.: Macmillan, 1911, p. 235.

Maritain, J. *The Degrees of Knowledge* (as above): pp. 236–37.

58 9 Driesch, H. *The Science and Philosophy of the Organism* (as above): pp. 85–109.

58 15–19 *On the Soul:* b. II, c. 4. See also:

COS: b. II, lect. 8.

McDougall points to the vast body of information that has been gathered by the modern physiologists on the structure of the cell, and on the complex processes that go on in the fertilized ovum as it grows, divides, and develops into a mature creature. "But of the *forces* at work, and of the power which *guides* these forces in building up the whole organism, we find no enlightenment." See:

McDougall, W. *The World of Life.* N.Y.: Moffat, Yard, 1911, pp. 318–19.

The problem of life, it should be noted, is not altogether a scientific one, nor should we expect the scientist to give answers to questions that properly fall in the field of philosophy. Certainly, Aristotle's conception of the soul, as the ultimate factor in the unfolding of the organism, is not only enlightening; it also complements, on the level of philosophic analysis, all the knowledge that has been brought to light by the scientist.

PAGE	LINE	
59	13–14	*On the Soul:* b. II, c. 1. See also: *COS:* b. I, lect. 1.
59	17–26	*ST:* p. I, q. 76, a. 1.
59	26–29	*ST:* p. I, q. 76, a. 4, r. to obj. 1.
60	7–11	Joad, C. E. M. *Guide to Modern Thought.* N.Y.: Stokes, 1933, pp. 114–15.
60	12–25	Gredt, J., O.S.B. *Elementa Philosophiae.* Freiburg: Herder, 1932, vol. I, pp. 331–32.
60 61	30– –1	O'Toole, G. B. *The Case Against Evolution.* N.Y.: Macmillan, 1925, p. 175.
61	2–11	Joad, *op. cit.:* pp. 113–14.
61	19–22	O'Toole, G. B. *Op. cit.:* p. 176. See also: *ST:* p. I, q. 78, a. 1. Here St. Thomas says that although vegetative operations are lowest in the scale of life (because of their intimate dependence on matter and material organs), yet they are superior to the operations of corporeal nature for the reason that the latter "are caused by an extrinsic principle; whereas vegetative operations proceed from an intrinsic principle." Thus I should like to observe, in interpretation of O'Toole's statement, that things can have an intrinsic finality of operation only when they have an intrinsic principle of operation.
61	22–30	*ST:* p. I, q. 78, a. 2, r. to obj. 1.
61 62	34– –13	*OS:* a. 13 (italics mine).

Chapter 6 THE ORIGIN OF ORGANIC LIFE

PAGE	LINE	
63	1–27	*Genetics in the 20th Century.* Edited by L. C. Dunn. N.Y.: Macmillan, 1951.
64	1–21	Phillips, R. P. *Modern Thomistic Philosophy.* London: Burns Oates & Washbourne, 1934, vol. I, pp. 322–27.
64	22–29	The question of the origin of organic life is intimately connected with that of its nature. Hence those who hold for its origin from matter are logically bound to a material conception of its nature; just as those who explain its nature by the laws of physics and chemistry are committed to a mechanistic view of its first emergence into being.
64 65	30– –13	Spencer, H. *Principles of Biology.* N.Y.: Appleton, revised and enlarged edition, 1900, 2 volumes. Haeckel, E. *The History of Creation.* Trans. by E. R. Lankaster. N.Y.: Appleton, 1876, vol. I, pp. 348–49. Huxley, T. *Darwiniana.* N.Y.: Appleton, 1896, pp. 108–09.

PAGE	LINE	
		Goodrich, E. S. *Living Organisms. An Account of Their Origin and Evolution.* Oxford: Clarendon Press, 1924, p. 27.
		Haldane, J. B. S. *The Causes of Evolution.* London: Longmans, Green, 2nd edition, 1935.
		Morgan, C. Lloyd. *Life, Mind and Spirit.* London: Williams and Norgate, 1926.
		Oparin, A. I. *The Origin of Life.* Trans. by S. Morgulis. N.Y.: Macmillan, 1938.
		Weismann, A. *Essays Upon Heredity and Kindred Biological Problems.* Trans. by Poulton, Schönland, and Shipley. Oxford: Clarendon Press, 2nd edition, 1891, vol. I, p. 34.
		Moore, B. *The Origin and Nature of Life.* N.Y.: Holt, Home University Library Series, p. 189.
65	25–27	Aitken, R. G. Behold the Stars! *The Great Design.* Edited by F. Mason. N.Y.: Macmillan, 1934, p. 33.
66	32–38	Cannon notes that the word "equilibrium" is more exactly used in reference to the relatively simple and closed systems of pure physical and chemical forces, where known energies are balanced. Physiological processes, on the other hand, though balanced, are highly complex; and the equilibrium that they attain is decidedly peculiar to living bodies. Therefore he suggests the word "homeostasis" to describe such states of balance. See:
		Cannon, W. B. *The Wisdom of the Body.* N.Y.: Norton, 1932, p. 24.
66	28–	
67	–4	Wasmann, E., S.J. *Modern Biology and the Theory of Evolution.* Trans. by A. M. Buchanan. St. Louis: Herder, 2nd edition, 1923, c. 7.
		The whole problem of the origin of life is in an unsatisfactory state, as far as science is concerned. Perhaps L. J. Henderson is right in saying (*The Fitness of Environment.* N.Y.: Macmillan, 1913, p. 310, footnote) that most modern biologists still follow the idea of Spencer in holding for a gradual evolution of life from nonliving matter. And this despite the fact that investigators today are more than ever unable to see just how such an emergence was possible! Apparently, without taking a final stand on the problem, some prefer to make unscientific guesses about what happened, rather than let the riddle rest. But rest it should, as far as science goes; because the problem is really a philosophic one!
67	5–6	*ST:* p. I, q. 45, a. 1.
67	33–	
68	–2	*AG:* b. III, c. 70.
68	16	The only improbability that I see in the theory of creation

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arises from the law of parsimony. It is perfectly possible that the law did not apply to the divine causality at the moment that life first appeared: in short, that God actually created the first living species. It seems to me, however, that the law of parsimony presents a difficulty to the creational theory; and so in the following section of the text, I have proposed the theory of restricted emergence as a more probable explanation of the origin of organic life. To be sure, it is nobler to create than merely to produce, as St. Thomas teaches (*ST:* p. I, q. 45, a. 1, r. to obj. 2); yet the question persists: why should He have created, when He could have made use of the secondary laws of nature to bring into existence the first forms of vegetative life?

68 24–33 *OPG:* q. 3, a. 11, r. to obj. 12.

ST: p. I, q. 45, a. 8, r. to obj. 3; q. 71, a. 1, r. to obj. 1; q. 72, a. 1, r. to obj. 5; q. 105, a. 1, r. to obj. 1.

69 17–24 *ST:* p. I, q. 2, a. 1.

70 8–11 *OPG:* q. 3, a. 7, r. to obj. 16.

70 11–15 This reading of Augustine's *De Genesi ad Litteram* is at least a probable one. See:

McKeough, M. J. *The Meaning of the Rationes Seminales in St. Augustine.* Washington, D.C.: Catholic University Press, 1926.

St. Thomas discusses Augustine's theory in his treatise on the work of the six days of creation (*ST:* p. I, q. 69, a. 2):

"With regard to the production of plants, Augustine's account of the matter differs from that of others. Thus, certain commentators, basing their views on a surface reading of the text [of Genesis], contend that vegetative organisms were produced *in act* on the third day of creation . . . whereas Augustine holds that at this time they were simply produced *in cause.* What he means is that the earth then received the power to produce them; and he supports his opinion by appeal to Holy Writ. . . . Therefore, the vegetative forms of life were first conceived inside the bosom of earth in their seminal causes before they actually sprang up and covered the face of the land. Reason confirms this interpretation. Thus on these first days, God created all things in their origin or causes; and then He rested. But 'He worketh until now'; that is, His work goes on, by the governance that He exercises over the processes of propagation. Now, the producing of plant life from the earth is a work of propagation. Hence it was not produced in act, on the third day, but only in its causes." Then, to show that the position of Augustine is only a probable one, St. Thomas adds:

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		"According to other writers, however, it may be said that the first production of species belongs to the work of the six days; whereas the reproduction among them of like from like, falls under the governance of the universe."
		It appears that St. Thomas was personally inclined to the view that the first plant organisms were created by God in their respective species. But the mind of the Angelic Doctor, which saw no contradiction either in the Augustinian theory of "seminal causes" or in the idea of spontaneous generation of life from non-life, would certainly see no contradiction in a theory of restricted emergence.
70	16–35	*On the Soul:* b. II, c. 2. See also:
71	7–11	*COS:* b. II, lect. 4.
71	13–15	*OPG:* q. 3, a. 11.
71	18–30	*In Petri Lombardi Quatuor Libros Sententiarum:* b. I, d. 8, q. 5, a. 3, r. to obj. 2.
72	1–13	*AG:* b. III, c. 81.
72	12–13	Genesis: c. 1, vv. 29–30.

Chapter 7 THE PROBLEM OF CONSCIOUSNESS

PAGE	LINE	
77	9–10	*OT:* q. 17, a. 1. See also:
		ST: p. I, q. 79, a. 13.
		Our English tongue has the advantage of different words —*consciousness* and *conscience*—to express the two meanings of the Latin *conscientia.* I should like to add that while consciousness, in its sensitive form, is common to both animal and man, conscience is properly human since reason is necessary in order to make moral judgments. Moreover, in St. Thomas's teaching, conscience is both an act and a habit.
77	26	I say "the self or the supposit" because the animal (which is a supposit but not a self or person) is also conscious of what transpires in its environment. Indeed, it seems to me that there is even some sort of knowledge of itself as an individual, an awareness of the concrete relationship that exists between itself and its surroundings. This would be self-knowledge only *in actu exercito,* that is, in the very act of being affected by external stimuli; not *in actu signato* which is genuinely reflexive and characteristic of man alone.
78	29–32	*ST:* p. I, q. 75, a. 2; q. 79, a. 1, r. to obj. 3; a. 10.
		St. Thomas (*OT:* a. 10, a. 1, r. to obj. 2) derives the word "mind" from "measure" (*mens a mensura*). This is a good point for our reflections, since only a mind can be the measure of truth and reality. But whereas God's mind is truly that measure, our minds are measured by truth and reality. In its modern meaning, "mind" is a most misleading word,

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		applied at times to both men and animals, and so watered down that it scarcely stands for anything real. Yet, it surely is too good a word to be lost to our vocabulary. See: Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 83–84.
78	35–	
79	–2	*OT:* q. 2, a. 2.
79	2–3	*On the Soul:* b. II, c. 12.
79	8	The example that I give in the text stresses the living quality of the cognitive process; the example of Aristotle, by contrast, lays emphasis on the non-suppression of the form that is received. Nutrition, as a vital event, is incomparably inferior to cognition. The former destroys the form of what it receives; the latter leaves it intact. Or, to put it in another way: nutrition suppresses its object, while cognition allows it to remain in all its *otherness.* As St. Thomas would say: the nutritive function receives things subjectively; the cognitive function, objectively.
79	9–17	Michel, V., O.S.B. Psychological Data. *The New Scholasticism,* April, 1929, pp. 185–88.
80	5	The "larger vision of man as a whole" is a direct inheritance from Aristotle and St. Thomas; that is to say, from what I shall refer to throughout the text as *the traditional psychology.* A word here about the origin of this tradition will not be amiss. Aristotle's masterpiece *On the Soul* was really the first systematic treatment of human nature among the ancient writers. Others before him, notably Democritus and Plato, had touched on certain problems. But Aristotle neglected no angle that he thought important for a well-rounded view of man. He was quick to separate the wheat from the chaff in the writings of his predecessors; and to re-shape their true insights so that they would fit organically into his own system. He drew his plan of human nature with a firm hand; and when he put it into effect, it was on the foundation of his own actual experience. The design of his psychology, as a whole, has never lost its first shape. St. Thomas recognized its worth and devoted a large space in his writings to the expansion of the ideas of Aristotle. In our own times, some trace of the Stagirite's teaching will be found in practically every school of modern psychology. See: Brennan, R. E., O.P. Troubador of Truth. *Essays in Thomism.* Edited by R. E. Brennan, O.P. N.Y.: Sheed & Ward, 1942, pp. 18–19.
80	15	Levine, A. J. *Current Psychologies.* Cambridge, Mass.: Sci-Art Publishers, 1940, p. 11.

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80	23–28	Titchener, E. B. *An Outline of Psychology.* N.Y.: Macmillan, 1923.
81	4–5	Weld, H. P. *Psychology as a Science.* N.Y.: Holt, 1928.
		Reid, A. C. *Elements of Psychology.* N.Y.: Prentice-Hall, 1938.
81	5	Wundt. W. *Outlines of Psychology.* Trans. by C. H. Judd. N.Y.: Stechert, 1897.
81	15	Stumpf, C. *Tonpsychologie.* Leipzig: Hirzel, vol. I, 1883; vol. II, 1890.
81	16–17	Dewey, J. The Reflex Arc Concept in Psychology. *Psychological Review,* 1896, 3, pp. 357–70.
		Angell, J. R. *An Introduction to Psychology.* N.Y.: Holt, 1918.
		Carr, H. A. *Psychology.* N.Y.: Longmans, Green, 1925.
		Higginson, G. D. *Psychology.* N.Y.: Macmillan, 1936.
81	21	Woodworth, R. S. *Dynamic Psychology.* N.Y.: Holt, revised edition, 1929.
81	28–30	Brentano, F. *Psychologie vom empirischen Standpunkte.* Leipzig: Meiner, vol. I, 1924; vol. II, 1925.
82	2–6	Spearman, C. *The Nature of 'Intelligence' and the Principles of Cognition.* London: Macmillan, 2nd edition, 1927.
82 83	25– –10	McDougall, W. *An Outline of Psychology.* London: Methuen, 3rd edition, 1926.
83	14–22	Watson, J. B. *Behaviorism.* N.Y.: Norton, revised edition, 1930.
83	28–32	Hunter, W. S. *Human Behavior.* Chicago: University of Chicago Press, 1928.
		Lashley, K. S. *Brain Mechanisms and Intelligence.* Chicago: University of Chicago Press, 1929.
83	34–35	Tolman, E. C. *Purposive Behavior in Animals and Men.* N.Y.: Century, 1932.
		Hull, C. L. *Principles of Behavior.* N.Y.: Appleton-Century, 1943.
		Skinner, B. F. *The Behavior of Organisms.* N.Y.: Appleton-Century, 1938.
84	6	Dunlap, K. *Elements of Psychology.* St. Louis: Mosby, 1936.
		Langfeld, H. A. A Response Interpretation of Consciousness. *Psychological Review,* 1931, *38,* pp. 87–108.
		Thorndike, E. L. *Human Learning.* N.Y.: Century, 1931.
84	18–19	Bekhterev, V. M. *General Principles of Human Reflexology.* Trans. by E. and W. Murphy. N.Y.: International Publishers, 1932.
		Pavlov, I. P. *Conditioned Reflexes.* Trans. by G. V. Anrep. London: Oxford University Press, 1927.

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84	21–27	Wertheimer, M. Experimentelle Studien über das Sehen von Bewegung. *Zeitschrift für Psychologie,* 1912, *61,* pp. 161–265.
84	27–28	Köhler, W. *Gestalt Psychology.* N.Y.: Liveright, revised edition, 1947. Koffka, K. *Principles of Gestalt Psychology.* N.Y.: Harcourt, Brace, 1935. Lewin, K. *A Dynamic Theory of Personality.* Trans. by D. K. Adams and K. E. Kener. N.Y.: McGraw-Hill, 1935.
85	20–	
86	–9	Freud, S. *New Introductory Lectures on Psychoanalysis.* N.Y.: Norton, 1933.
86	21	Jung, C. *Psychological Types.* Trans. by H. G. Baynes. N.Y.: Harcourt, Brace, 1923.
86	22–27	Adler, A. *The Practise and Theory of Individual Psychology.* N.Y.: Harcourt, Brace, 2nd edition, 1927.
86	28–33	Rank, O. *Will Therapy.* N.Y.: Knopf, 1936.
86	34–	
87	–5	The gradual orientation of modern psychology towards the study of *man, as such,* is nowhere better seen than in the tendency towards a personalistic outlook among the various schools, particularly with the hormic psychologists, the latter-day gestaltists, and the psychoanalysts. Worthy of special note is the work of McDougall, whose insistence on purposive principles behind human behavior has been largely responsible, it seems to me, for the personalistic ideas that are now appearing in the textbooks. But apart from the influence of the hormic psychology, a fresher and more integral point of view was bound to come, due to the almost overwhelming growth of factual findings in both the laboratory and the clinic. A larger frame of reference was demanded; and the concepts of personalism provided just such a frame. The connection of purposiveness with personalism is most interesting, implying, as it does, that all our psychological activities are directed towards the formation, development and well-rounded expression of personality—which, in turn, as St. Thomas would add, is designed towards the fulfillment of man's destiny as a person. What that destiny comprises is really a matter for the moral philosopher to explain; but it cannot be other than a goal of happiness, and of ultimate union of the human with the divine. As samples of the personalistic approach in psychology today, we may mention: Allport, G. W. *Personality: A Psychological Interpretation.* London: Constable, 1947. Boring, E. G., Langfeld, H. A., and Weld, H. P., whose three

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texts, *Psychology, A Factual Textbook, Introduction to Psychology,* and *Foundations of Psychology,* edited since 1935, and referred to constantly in our own *General Psychology,* certainly give an over-all impression of interest in the personalistic approach.

Lewin, K. *A Dynamic Theory of Personality,* listed above with the works of the gestaltists.

Stern, W. *General Psychology from the Personalistic Standpoint.* Trans. by H. D. Spoerl. N.Y.: Macmillan, 1938.

For a discussion of how the behavioristic teachings of men like J. B. Watson, C. L. Hull, and E. C. Tolman, fit (or fail to fit) the demands of a personalistic approach, see:

Smith, F. V. *The Explanation of Human Behavior.* London: Constable, 1951.

87 | 5–6 — *On the Soul:* b. III, c. 4.

87 | 12 — Boring, E. G. The Nature of Psychology. *Foundations of Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1948, p. 11.

87 | 20 — If a true science of human nature outruns any school or partial view, then for all the greater reason a true philosophy of human nature is pledged to a total or whole-making conception of man. The very idea of philosophy is to know all things in their ultimate causes; and the minds of Aristotle and St. Thomas, it seems to me, have made the closest approach to this holistic knowledge of reality. Their goal, as philosophers, was wisdom; and as philosophic psychologists, the wisdom or ultimate truth of human nature. *De jure,* therefore, the traditional psychology seeks to know the whole truth about man; and in this sense it simply supersedes all schools or partial views. *De facto,* of course, there are many things of which even the psychology of the tradition is ignorant, since the nature of man has so many depths and secret recesses that only the wisdom of God can fully measure it.

87 | 21–
88 | –24 — Traditional psychology:

Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941.

Fröbes, J., S.J. *Psychologia Speculativa.* Freiburg: Herder, 1927, 2 volumes.

Gredt, J., O.S.B. *Elementa Philosophiae.* Freiburg: Herder, 7th edition, 1937, vol. I.

Maher, M., S.J. *Psychology.* N.Y.: Longmans, Green, 9th edition, 1926.

Mercier, D. *A Manual of Modern Scholastic Philosophy.*

PAGE	LINE	
		Lashley, K. S. *Brain Mechanisms and Intelligence*. Chicago: University of Chicago Press, 1929.
93	11	The literature on the anatomy and physiology of the brain is abundant. Of recent date, we may cite:
		Laslett, P. (editor). *The Physical Basis of Mind*. N.Y.: Macmillan, 1950.
		Lindworsky, J., S.J. *Experimental Psychology*. Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 210–15.
		Morgan, C. T., and Stellar, E. *Physiological Psychology*. N.Y.: McGraw-Hill, 2nd edition, 1950, c. 3.
		Penfield, W., and Rasmussen, T. *The Cerebral Cortex of Man*. N.Y.: Macmillan, 1951.
94	18–22	Cannon, W. B. *The Wisdom of the Body*. N.Y.: Norton, 1932, pp. 230–48.
95	4–5	Hunter, W. S. *Human Behavior*. Chicago: University of Chicago Press, revised edition, 1928, p. 175.
95	5–15	Carmichael, L. The Response Mechanism. *Introduction to Psychology*. Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1939, pp. 223–29.
95	16–	
96	–7	Sherrington, C. S. *The Integrative Action of the Nervous System*. New Haven: Yale University Press, 1906, pp. 45–65; 120–28. See also:
		Hunter, W. S. *Op. cit.*: pp. 175–82.
96	8–	
97	–11	Troland, L. T. *The Principles of Psychophysiology*. N.Y.: Van Nostrand, 1932, vol. III, pp. 322–42.
97	12–37	Pavlov, I. P. *Lectures on Conditioned Reflexes*. Trans. by W. H. Gantt. N.Y.: International Publishers, vol. I, 1928; vol. II, 1941.
		Garrett, H. E. *Great Experiments in Psychology*. N.Y.: Appleton-Century, revised edition, 1941, c. 11.
98	20–29	Levine, A. J. *Current Psychologies*. Cambridge, Mass.: Sci-Art, 1940, pp. 31–33.
		Chapter 9 SENSATION
101	3–24	*ST:* p. I, q. 78, a. 3.
		OT: q. 26, a. 3, r. to obj. 4.
103	9–11	*ST:* p. I, q. 84, a. 6.
103	12–23	St. Thomas says (*ST:* p. I, q. 78, a. 3): "To be aware of the nature of sensible qualities is not the task of the senses but of intellect." The accent, here, is on the word "nature." Hence, while the senses are able to know the qualities of sense objects, they are not able to grasp the essence of such

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		qualities. They recognize a red color, for example, but they do not appreciate the meaning of redness, as such. Aquinas then goes on to say: "Sense is a passive power and is naturally changed by the action of an external sensible object. Therefore, it is the exterior cause of such change that is immediately known by sense." This means, in so many words, that our senses are directly aware of the impinging of an outside stimulus on them; from which it follows that in the act of sensation, there is consciousness and therefore knowledge in the external sense powers.
103	36	Boring, E. G. Sensation. *Introduction to Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1939, c. 16.
		Smith Stevens, S. Sensation and Psychological Measurement. *Foundations of Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1948, c. 11.
104	14–30	For a summary discussion of Johannes Müller's theory of specific nerve energies, see:
		De la Vaissière, J., S.J. *Elements of Experimental Psychology.* Trans. by S. A. Raemers. St. Louis: Herder, 2nd edition, 1927, pp. 60–62. Also:
		Garrett, H. E. *Great Experiments in Psychology.* N.Y.: Appleton-Century, revised edition, 1941, c. 15.
106	12–25	Adrian, E. D. *The Basis of Sensation.* N.Y.: Norton, 1928, pp. 118–20.

Chapter 10 BODY SENSATIONS

PAGE	LINE	
108	5	*ST:* p. I, q. 78, a. 3, r. to obj. 3.
108	8–	
109	–13	Carrel, A. *Man the Unknown.* London: Hamilton, 1935, pp. 64–69.
110	10–16	Weber, E. H. Ueber das Tastsinn. *Archiv für Anatomie und Physiologie,* 1835, pp. 152–59. See also:
		Geldard, F. A. Somesthesis. *Foundations of Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1948, p. 365.
110	17–18	*On the Soul:* b. II, c. 9.
110	18–27	*COS:* b. II, lect. 19.
111	6–8	
112	31–32	Howell, W. H. *A Text-Book of Physiology.* Phila.: Saunders, 12th edition, 1933, p. 291.
112	32	References for cutaneous sensations:
		Dallenbach, K. M. Somesthesis. *Psychology. A Factual Textbook.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1935, pp. 154–73.

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		Geldard, F. A. *Op. cit.:* pp. 360–70.
		Nafe, J. P. The Pressure, Pain and Temperature Senses. *A Handbook of General Experimental Psychology.* Edited by C. Murchison. Worcester: Clark University Press, 1934, pp. 1037–72.
		Troland, L. T. *The Principles of Psychophysiology.* N.Y.: Van Nostrand, 1930, vol. II, pp. 296–328.
114	11	References for sensations of movement:
		Dallenbach, K. M. *Op. cit.:* pp. 173–76.
		Geldard, F. A. *Op. cit.:* pp. 370–72.
		Nafe, J. P. *Op. cit.:* pp. 1072–73.
		Troland, L. T. *Op. cit.:* pp. 336–47.
116	32	References for sensations of balance:
		Dallenbach, K. M. *Op. cit.:* pp. 176–84.
		Dusser de Berenne, J. G. The Labyrinthine and Postural Mechanisms. *A Handbook of General Experimental Psychology.* Edited by C. Murchison. Worcester: Clark University Press, 1934, pp. 204–46.
		Geldard, F. A. *Op. cit.:* pp. 374–78.
		Howell, W. H. *Op. cit.:* c. 21.
		Nafe, J. P. *Op. cit.:* pp. 1073–74.
		Troland, L. T. *Op. cit.:* pp. 329–36.
116	36	Luciani, L. *Human Physiology.* Trans. by F. A. Welby. London: Macmillan, 1917, vol. IV, pp. 57–125.
121	25	References for organic sensations:
		Dallenbach, K. M. *Op. cit.:* pp. 184–86.
		Geldard, F. A. *Op. cit.:* pp. 372–74.
		Troland, L. T. *Op. cit.:* pp. 365–69.
		Chapter 11 THE CHEMICAL SENSES
122	1–24	Howell, W. H. *A Text-Book of Physiology.* Phila.: Saunders, 12th edition, 1933, pp. 310–12.
123	1–8	For a discussion of some of the possible ways in which stimulation may be brought about, see:
		Troland, L. T. *The Principles of Psychophysiology.* N.Y.: Van Nostrand, 1930, vol. II, pp. 275–78.
123	28	Zwaardemaker, H. *Die Physiologie des Geruchs.* Leipzig: Engelmann, 1895.
		———. *L'Odorat.* Paris: Doin, 1925.
123	35	Henning, H. *Der Geruch.* Leipzig: Barth, 2nd edition, 1924.
125	28	Pfaffman, C. Taste and Smell. *Foundations of Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1948, pp. 356–59.
		Zigler, M. J. Taste and Smell. *Psychology. A Factual Text-*

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		book. Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1935, pp. 146–53.
125	29–	
126	–19	Howell, W. H. *Op. cit.:* pp. 305–07.
126	20–36	Troland, L. T. *Op. cit.:* pp. 292–95.
127	14	Henning, H. Die Qualitätenreihe des Geschmacks. *Zeitscrift für Psychologie,* 1916, *74,* pp. 203–19.
128	5	Burton-Opitz, A. *A Text-Book of Physiology.* Phila.: Saunders, 1921, pp. 751–52.
128	6–26	Troland, L. T. *Op. cit.:* p. 284.
128	27–	
129	–5	Pfaffman, C. *Op. cit.:* pp. 353–56.
		Zigler, M. J. *Op. cit.:* pp. 140–46.
129	6–	
130	–17	Blakeslee, A. F. A Dinner Demonstration of Threshold Differences in Taste and Smell. *Science,* May 24, 1935, pp. 504–07.
		Parker, G. H. Smell and Taste. *Encyclopaedia Brittanica,* 14th edition, 1929, vol. XX, p. 820.
		Chapter 12 HEARING
131	1–	
132	–15	Wever, E. G. Audition. *Introduction to Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1939, pp. 561–65.
136	3	Gray, H. *Anatomy of the Human Body.* Phila.: Lea and Febiger, 22nd edition, revised by W. H. Lewis, 1930, pp. 1022–52.
137	2	Morgan, C. T. and Stellar, E. *Physiological Psychology.* N.Y.: McGraw-Hill, 2nd edition, 1950, pp. 200–08.
138	27	Helmholtz, H. L. von. *On the Sensations of Tone.* Trans. by A. J. Ellis. N.Y.: Longmans, Green, 4th edition, 1912, cc. 1 and 10–13.
		As the translator points out, Helmholtz's term *Obertöne* is a contraction of *Oberpartialtöne,* which is more correctly rendered in English as *upper partial tones* than as *overtones.* See also:
		Wever, E. G. *Op. cit.:* pp. 577–88.
139	15	Moore, H. T. The Genetic Aspect of Consonance and Dissonance. *Psychological Monographs,* 1914, *17,* 68 pp.
139	28–	
140	–11	Helmholtz, H. L. von. *Op. cit.:* c. 6.
140	37–	
141	–12	Rutherford, W. Tone Sensation. *British Medical Journal,* 1898, *2,* pp. 353–58.

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141	16–26	Wever, E. G. and Bray, C. W. Present Possibilities for Auditory Theory. *Psychological Review,* 1930, *37,* pp. 365–80.
141	30–	
142	–8	Ewald, J. R. Zur Physiologie des Labyrinths: VI. *Pflug. Arch. für die gesamte Physiologie,* 1899, *76,* pp. 147–88.
		Chapter 13 VISION
143	1–26	Fuller, R. W., Brownlee, R. B., and Baker, D. L. *Elements of Physics.* N.Y.: Allyn and Bacon, 1946, c. 24.
		Purdy, D. M. Vision. *Introduction to Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1939, pp. 531–33.
145	27	Gray, H. *Anatomy of the Human Body.* Phila.: Lea and Febiger, 22nd edition, revised, 1930, pp. 994–1013.
146	28	Burton-Opitz, A. *A Text-Book of Physiology.* Phila.: Saunders, 1921, cc. 68–72.
147	28	Dimmick, F. L. Color. *Foundations of Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1948, c. 12.
		Troland, L. T. *The Principles of Psychophysiology.* N.Y.: Van Nostrand, 1930, vol. II, pp. 351–56.
		Woodworth, R. S. and Marquis, D. G. *Psychology.* N.Y.: Holt, 5th edition, 1949, pp. 444–51.
151	9	In the text, I have mentioned only one way of distinguishing positive and negative images. For other ways, see:
		Warren, H. C. (editor). *Dictionary of Psychology.* Boston: Houghton-Mifflin, 1934, under the entry "after-image."
152	11	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 36–39.
152	26	Lindworsky, J. *Op. cit.:* pp. 43–44.
		Dimmick, F. L. *Op. cit.:* pp. 288–90.
152	35	Dalton, J. Extraordinary Facts Relating to the Vision of Colours. *Memoirs of the Literary and Philosophical Society of Manchester,* 1798, 5, part I, pp. 31–35.
154	12	Purdy, D. M. *Op. cit.:* pp. 542–44.
		Dimmick, F. L. *Op. cit.:* pp. 294–95.
154	18–	
155	–7	Helmholtz, H. L. von. *Treatise on Physiological Optics.* Trans. by J. P. C. Southall. Ithaca, N.Y.: The Optical Society of America, 1924–25. 3 vols.
		This treatise, together with *The Sensations of Tone* mentioned in the previous chapter, represents an amount of research that for one man was stupendous. Helmholtz worked over all existing knowledge on the subject of vision and hearing, tested it experimentally, devised new methods of study, and contributed his own important theories. His visual and

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		auditory powers are said to have been extraordinarily sensitive and accurate.
155	8–32	Hering, E. *Grundzüge der Lehre vom Lichtsinn.* Berlin: Springer, 1920.
155	33–	
156	–26	Ladd-Franklin, C. *Color and Color Theories.* N.Y.: Harcourt, Brace, 1929.
157	38	Gruender, H., S.J. *Experimental Psychology.* Milwaukee: Bruce, 1932, pp. 42–43; 77–81.

Chapter 14 COMMON SENSE AND PERCEPTION

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159	10	In this chapter, and throughout the text, I shall confine my use of the word "perception" to the level of sense knowledge. It is often employed in a broader way to mean "understanding," as, for example, in the Scriptural passage: "I perceive that thou art a prophet." There are many words in our language to describe the intellectual process; whereas "perception" is the only one that does justice to the acts of the interior senses, and especially of common sense.
160	9	*ST:* p. I, q. 78, a. 4.
160	13–36	*DPA:* c. 4. Here the theory of Aquinas is well summed up, as follows: "Common sense is the power from which all the other senses are derived, to which they relay their impressions, and in which they are all united." This agrees, in substance, with what Aristotle says (*On Sleeping and Waking:* c. 2): "Every [outer] sense has something proper, and something common: *proper,* as vision, for example, is proper to the sense of sight, hearing to the sense of hearing, and so on with the rest of the outer senses; and *common,* inasmuch as all [the outer senses] are attached to a common sense, in virtue of which a person perceives that he sees or hears. For certainly, it is not by the proper sense of sight that he sees that he sees. No more is it by the proper sense of taste or of sight, or of both taken together, that he knows and has the power of knowing that sweet is different from white. Rather, this is done by a faculty which has a common connection with all the organs of the outer senses." (Italics mine.) See also: *ST:* p. I, q. 78, a. 4, r. to obj. 2.
161	1–18	Aristotle. *On the Soul:* b. III, cc. 1 and 2. *COS:* b. III, lect. 1 and 3. Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 122–23; 140–41.
161	25–	
162	–31	*OS:* a. 13. In the passage to which we refer here, St. Thomas

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		clearly indicates the three psychological features of common sense which we described in the text. First of all, it enables its possessor to form "some judgment about the sensible qualities" that it receives from the outer senses; secondly, it "distinguishes these qualities, one from another"; thirdly, it accomplishes this unique task by virtue of its power of putting together what it has separated; a power, to wit, wherein "all sensible qualities [derived from the outer senses] are related."
163	4–12	*DPA:* c. 4. St. Thomas's position is expressed thus: "The cortex of the brain, whence the nerves of the outer senses originate, is the organ of common sense. By this arrangement, the vital responses of the outer senses are dependent on common sense. Yet, as far as its own knowledge is concerned, common sense apprehends things only when thrown into movement by the outer senses, since it would be aware of nothing if these latter powers did not communicate to it their precious burden of information."
164	1–31	Brown, W. The Perception of Spatial Relations. *Psychology. A Factual Textbook.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1935, pp. 207–10.
		Carr, H. A. *An Introduction to Space Perception.* N.Y.: Longmans, Green, 1935, pp. 9–18.
		Maher, M., S.J. *Psychology.* N.Y.: Longmans, Green, 9th edition, 1926, pp. 131–39.
164	32–	
165	–11	Brown, W. *Op. cit.:* pp. 210–13.
		Carr, H. A. *Op. cit.:* c. 11.
165	12–	
166	–4	Brown, W. *Op. cit.:* pp. 222–28.
		Carr, H. A. *Op. cit.:* c. 6.
		Dimmick, F. L. Visual Space Perception. *Foundations of Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1948, 298–304.
166	5–28	Brown, W. *Op. cit.:* pp. 216 ff.
		Carr, H. A. *Op. cit.:* cc. 7–9.
166	29–	
167	–5	Brown, W. *Op. cit.:* pp. 236–38.
		Carr, H. A. *Op. cit.:* cc. 4–5.
167	6–31	Brown, W. *Op. cit.:* pp. 210–11; 213–15.
		Carr, H. A. *Op. cit.:* c. 11.
		Dimmick, F. L. *Op. cit.:* pp. 304–07.
167	32–	
168	–25	Bentley, M. *The Field of Psychology.* N.Y.: Appleton, 1924, pp. 231–34.

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		Carr, H. A. *Op. cit.:* c. 10. DeSilva, H. R. Perception of Movement. *Psychology. A Factual Textbook.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1935, pp. 260–73. Dimmick, F. L. *Op. cit.:* pp. 307–11.
168	26–	
169	–5	Time, as St. Thomas teaches (for example, *ST:* p. I, q. 10, a. 1), is that species of duration which is proper to things that are changeable. It is the measure of the movements of corporeal creatures; that is, of things that can have a past, a present, and a future. Plato looked at it as a moving image of eternity; Augustine, as the distention or enlargement of the soul by its contact with matter; Aristotle and Aquinas, as the number or measure of movement *secundum prius et posterius,* that is, according to the earlier and later parts of that movement.
169	11–14	Shakespeare. *As You Like It:* act III, scene 2.
169	19–31	James, W. *Psychology.* N.Y.: Holt, 1892, pp. 283–85.
169	32–	
170	–5	Carrel, A. *Man the Unknown.* London: Hamilton, 1935, p. 185. For further discussion of the temporal aspects of perception, see: Newman, E. B. Perception. *Foundations of Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1948, pp. 242–45. Tinker, M. A. Temporal Perception. *Psychology. A Factual Textbook.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1935, pp. 246–56.
170	6–	
171	–9	Miner, J. B. Motor, Visual and Applied Rhythms. *Psychological Review Monograph Studies,* 1903, *5,* no. 21. Newman, E. B. *Op. cit.:* pp. 245–49. Tinker, M. A. *Op. cit.:* pp. 256–59.
171	10–	
172	–17	Lindworsky, J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, 6th section, c. 1. Moore, T. V., O.S.B. Gestalt Psychology and Scholastic Philosophy. *The New Scholasticism,* Jan. 1934, pp. 46–80.
172	23–31	*ST:* p. I, q. 78, a. 4, r. to obj. 2.
174	17–	
175	–14	Woodworth, R. S. *Psychology.* N.Y.: Holt, revised edition, 1929, pp. 381–92. Carr, H. A. *Op. cit.:* pp. 277–83.
175	20–	
176	–23	Brown, W. *Op. cit.:* pp. 230–34.

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		Dimmick, F. L. *Op. cit.:* pp. 305–06. Luckiesch, M. *Visual Illusions.* N.Y.: Van Nostrand, 1922, cc. 4–8. Woodworth, R. S. and Marquis, D. G. *Psychology.* N.Y.: Holt, 5th edition, 1949, pp. 429–35.
176	24–	
178	–12	Brennan, R. E., O.P. *A Theory of Abnormal Cognitive Processes, according to the Principles of St. Thomas Aquinas.* Wash., D.C.: Catholic University of America, 1925, pp. 35–37. Note that because the illusion is a perceptual datum, it falls directly and immediately within the realm of the common sensibles. Indirectly, however, it may attach to a proper sensible, when there is some defect in the exterior sense that registers such a sensible.
178	13–	
179	–32	*ST:* p. I, q. 16, a. 2; q. 17, aa. 1–3; q. 85, a. 6. Intellect, whose task is to deal with the universal, and whose functions are essentially free of the contingencies of the here and now, is always in a strategic position to supervise the data of sense and to correct the misinformations that sometimes arise from the various sensoria. This it does by appeal to a wider experience than that with which the senses are presently occupied; by establishing comparisons with previous knowledge which helps to interpret what is going on at the moment in the senses; by making allowance for recognized defects in the end organs; and so forth. See also: Maritain, J. *The Degrees of Knowledge.* Trans. by B. Wall and M. R. Adamson. N.Y.: Scribners, 1938, pp. 142–44, footnote.
		Chapter 15 IMAGINATION
182	13–26	*ST:* p. I, q. 78, a. 4. *OS:* a. 4, obj. 1; and a. 13. *DPA:* c. 4. Brennan, R. E., O.P. The Thomistic Concept of Imagination. *New Scholasticism,* April, 1941, pp. 149–61.
183	3–19	*COS:* b. III, lect. 5 and 6.
183	20–23	St. Thomas was familiar only with the gross anatomy of the brain as an organ to which incoming impulses are carried. He had no knowledge of the topography of cortical centers, as we recognize these today. Thus he locates the organ of imagination in an area of the cortex "posterior to the organ of common sense where the nerve substance is less humid." This greater freedom from humidity, in his theory, accounts

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261 262	25– –4	Paton, D. N. *Op. cit.:* cc. 1, 5, 6, 7.
262	14–18	Osborn, H. F. Recent Revivals of Darwinism. *Science*, Feb. 24, 1933, pp. 199–202.
263	11–31	O'Toole, G. B. *The Case against Evolution.* N.Y.: Macmillan, 1925, pp. 271–74. St. Thomas has some interesting observations to make on man's upright position and why it is more natural to him than to the animal. One reason is the different rôle of the senses and lower appetites. Thus, the animal's life gravitates around objects of nutrition and sex. Man, on the other hand, can see beyond these physical goods and the pleasures they yield. He can lift up his eyes and contemplate the sun, the moon, and the stars in their courses, and meditate on their wondrous order. Another reason is the different function of appendages. For example, if man had to use his fore-limbs for purposes of progression, it would be difficult to cultivate habits of art and the various skills that depend on the facile use of his fingers. Imagine the painter, the sculptor, or the surgeon with hands that were like feet! A third reason is connected with our superior powers of communication. As Aquinas points out, many delicate services are rendered to man's mouth by his hands, thus preserving his lips and tongue for the more refined tasks of speech, song, and poetic expression which are strictly human accomplishments. (*ST:* p. I, q. 91, a. 3.)
263 264	32– –5	Dwight, T. *Thoughts of a Catholic Anatomist.* N.Y.: Longmans, Green, 1927, pp. 188–89.
264	6–38	Ranke, J. *Der Mensch.* Leipzig: Bibliographisches Institut, Bd. I, 1888, pp. 145ff. For a good discussion of the law of ontogenesis see: O'Toole, G. B. *Op. cit.:* pp. 275–86. Wasmann, E., S.J. *Op. cit.:* pp. 446–55.
265	1–27	Darwin, C. *The Descent of Man.* N.Y.: Cerf and Klopfer, The Modern Library, c. 1. O'Toole, G. B. *Op. cit.:* pp. 286–308.
265 267	28– –14	Kobel, J. The Evolution of Man. *The Franciscan Educational Conference.* Wash., D.C.: 1933, pp. 76–90. Stenger, F. R. Recent Data on Primitive Man. *American Ecclesiastical Review,* Oct. 1939, pp. 301–10. St. Thomas (*ST:* p. I, q. 91, a. 2) inclines to the view that the body of the first man was made immediately by God. He admits, with St. Augustine, that it could have been virtu-

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		ally present in the matter of the universe; yet, because "no pre-existing body had been formed whereby another body of the same species could be generated," he concludes that the first human body came into being through the direct action of the Creator. Another point debated by the theologians is whether our first parent, Adam, was more perfect, physically and mentally, than the men whose specimens we have just discussed. The probable opinion, here, is that these latter were more or less degenerate descendants of the founder of our race.
267	15–34	Cooper, J. M. Primitive Man. *Quarterly Bulletin of the Catholic Anthropological Conference*. Wash., D.C.: Catholic University of America, vol. VIII, Jan. and April, 1935. (The brochure also discusses the impossibility of an evolution of man's mind.)
268	18–23	*ST:* p. I, q. 118, a. 2, r. to obj. 2.
268	23–27	*ST:* p. I, q. 76, a. 4, r. to obj. 4.
269	7–12	*AG:* b. III, c. 70.
269	34–	
270	–4	*AG:* b. III, c. 70.
270	4–8	*OPG:* q. 3, a. 4, r. to obj. 7.
270	13–14	*OPG:* q. 3, a. 7, r. to obj. 16.
271	11–13	*OPG:* q. 3, a. 11, r. to obj. 7. See also references to St. Thomas's teaching at the end of c. 6 of our text. Also: Phillips, R. P. *Modern Thomistic Philosophy*. London: Burns Oates & Washbourne, 1934, vol. I, pp. 207–10.
271	14–21	*AG:* b. II, c. 82.
272	5–6	*AG:* b. III, c. 81.

Chapter 21 THE HUMAN MIND

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276	17–19	The chief offender in this respect is J. B. Watson, the father of behaviorism. See, for example, his *Behaviorism*. N.Y.: Norton, revised edition, 1930, cc. 1 and 10.
277	5–8	Binet, A. *Etude expérimentale de l'Intelligence*. Paris: Schleicher, 1903.
277	15–20	Spearman, C. *The Nature of 'Intelligence' and the Principles of Cognition*. London: Macmillan, 2nd edition, 1927, c. 1.
277	25–37	*In Petri Lombardi Quatuor Libros Sententiarum:* b. III, d. 35. q. 2, a. 2, query 3, solution 1. *ST:* p. I, q. 79, a. 10; p II–II, q. 8, a. 1. For St. Thomas, the essential notion of human intelligence is grounded on the ability to abstract. He does not stop here, however, in his analysis. From the standpoint of object, the mind of man is properly exercised with the natures of cor-

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		poreal creatures; that is, of beings composed (like himself) of matter and form. But it is adequately exercised and exhausted only by the consideration of absolute and infinite truth. In fine, the proper definition of the human mind focusses on the notion of *capax abstractionis,* or the power of abstracting ideas from the data of sense; but its adequate definition pictures it as nothing short of *capax infiniti,* or able to attain to a knowledge of Truth itself, that is, of God. For the teaching of Aquinas on this latter point, see:
		ST: p. I–II, q. 2, a. 8, r. to obj. 3; q. 3, a. 8; q. 5, a. 5, r. to obj. 2.
278	8–12	Spearman, C. *Op. cit.:* pp. 19–20.
278	17–23	*ST:* p. I, q. 85, a. 5.
278	24–	
279	–4	Spearman, C. *Op. cit.:* pp. 341–43.
279	13–15	Terman, L. C., with E. L. Thorndike and others. Intelligence and Its Measurement; a Symposium. *Journal of Educational Psychology,* 1921, *12,* pp. 123–212.
279	17–25	Spearman, C. *The Abilities of Man.* N.Y.: Macmillan, 1927, pp. 21–22.
		Chapter 22 THE CONCEPTUAL PROCESS
280	1–4	*ST:* p. I, q. 84, a. 7; q. 85, a. 2, r. to obj. 2.
280	4–7	*ST:* p. I, q. 15, aa. 2 and 3.
		OT: q. 3, a. 3.
280	11–14	*ST:* p. I, q. 57, a. 1, r. to obj. 2. See also:
		AG: b. II, c. 66.
		OSC: a. 1.
280	24–	
281	–19	*ST:* p. I, q. 78, a. 1; q. 79; q. 80, a. 1.
		COS: b. III, lect. 7–10.
		In Petri Lombardi Quatuor Libros Sententiarum: b. II, d. 17, q. 2, a. 1.
		OS: a. 14.
		OUI: cc. 5 and 6.
		OSC: aa. 9 and 10.
		CT: cc. 81, 83, 87, 88.
281	20–35	*OS:* a. 15.
		OSC: aa. 1 and 2.
		In Petri Lombardi Quatuor Libros Sententiarum: b. III, d. 14, q. 1, a. 1, query 5, solution 2.
		As Aristotle remarks (*On the Soul:* b. I, c. 4): "To say it is the soul that is angry is the same as saying it is the soul that weaves [a garment] or builds [a house]. Better, then, to

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avoid such statements as that the soul feels pity, or the soul learns, or the soul reasons; and say, rather, it is man [who does these things] by means of his soul."

281 36–
283 –11 *ST:* p. I, q. 75, aa. 2 and 5; q. 76, a. 1; q. 84; q. 85, aa. 1 and 2.

AG: b. II, cc. 59–78; c. 96. In c. 73, St. Thomas enumerates the powers in which phantasms are found and from which abstraction is made by active intellect. They are imagination, memory, and estimative or cogitative power; in short, all the re-presentative senses.

COS: b. III, lect. 3–8.

OT: q. 10, aa. 4, 5, 6, 8.

OS: aa. 3, 5, and 20.

CT: c. 38. Here St. Thomas tells us why it is so apt to speak of "conceiving" an idea. Thus, "Something is said to be conceived in a physiological way when it is formed in the living womb by the quickening active movement of the male element, and the passive [or receptive] movement of the female element; and when what is thus conceived is like in kind to both parents. Now, what is conceived in the mind is formed there by the active movement of the object and the receptive movement of the mind; while the concept is like in kind to both the object and the mind." The object, it should be noted, fertilizes or impregnates the mind, that is, possible intellect, by means of the intelligible species of active intellect.

Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 179–86.

Adler, M. J. *What Man Has Made of Man.* N.Y.: Longmans, Green, 1937, pp. 52–53.

284 12–16 *On the Soul:* b. III, c. 7. Also, c. 8.

284 17–23 *ST:* p. I, q. 75, a. 2, r. to obj. 3; q. 84, aa. 3 and 7.

OS: a. 15.

COS: b. III, lect. 13.

CT: c. 82.

EOT: q. 6, a. 2, r. to obj. 5.

St. Thomas makes allowance for an *obediential* power in intellect to receive knowledge without conversion to phantasms; but this does not happen in the natural course of events, or according to our present state of existence. On this point see:

ST: p. I, q. 89, a. 2; p. III, q. 11, a. 2; q. 34, a. 2, r. to obj. 3. Even on earth, however (but only in a supernatural way), it is possible that intellect, illumined by faith and perfected by

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		the gift of understanding, "should receive the truths that are proposed to it about God no longer by way of corporeal phantasms." Such, of course, would be the mystical experiences of the saints. See:
		ST: p. II–II, q. 8, a. 8.
284	27–29	*On the Soul:* b. I, c. 4 (translated above).
284	33–34	Aristotle: *Posterior Analytics:* b. II, c. 19.
284	39–	
285	–18	*ST:* p. I, q. 76, a. 2, r. to obj. 3.
		OT: q. 19, a. 1; q. 26, a. 3, r. to obj. 12.
		Sertillanges, A., O.P. *The Intellectual Life.* Trans. by M. Ryan. Cork: Mercier Press, 1946, pp. 33–34.
285	37–	
286	–18	Bühler, K. Tatsachen und Probleme zu einer Psychologie der Denkvorgänge. *Archiv für die gesamte Psychologie:*
		I. Über Gedanken, 1905, 9, pp. 297–365.
		II. Über Gedankenzusammenhänge, 1908, *12,* pp. 1–23.
		III. Über Gedankenerinnerungen, 1908, *12,* pp. 24–92.
		———. Eine Bemerkung zu der Diskussion über die Psychologie des Denkens. *Zeitschr. für Psychologie,* 1919, *82,* pp. 97–101.
		———. Antworf auf die von W. Wundt erhobenen Einwände gegen die Methode der Selbstbeobachtung an experimentell-erzeugten Ergebnissen. *Archiv für die gesamte Psychologie,* 1908, *12,* pp. 93–123.
		Binet, A. *L'Etude expérimentale de l'Intelligence.* Paris: Schleicher, 1903.
		Woodworth, R. S. Imageless Thought. *Journal of Philosophy,* 1906, 3, pp. 701–07.
		Watson, J. B. *Op. cit.:* cc. 10 and 11.
		Titchener, E. B. *Lectures on the Experimental Psychology of the Thought-Processes.* N.Y.: Macmillan, 1909, lect. 4.
286	25–29	Willwoll, A. *Die Begriffsbildung.* Leipzig: Hirzel, 1926.
286	30–	
287	–10	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 251–52.
		De la Vaissière, J., S.J. *Elements of Experimental Psychology.* Trans. by S. A. Raemers. St. Louis: Herder, 2nd edition, 1927, pp. 288–98.
		Chapter 23 THE JUDICIAL PROCESS
288	13	*ST:* p. I, q. 85, a. 5. See also:
		EOT: q. 5, a. 3.
288	20–23	Noël, L. The Realism of St. Thomas. *Blackfriars,* Nov. 1935, p. 827.

PAGE	LINE	
288	25	Goethe, W. *Faust.* Trans. by A. G. Latham. N.Y.: Dutton, p. 54.
288	27	Maritain, J. *The Degrees of Knowledge.* Trans. by B. Wall and M. R. Adamson. N.Y.: Scribners, 1938, pp. 38ff.
289	11–12	*ST:* p. I–II, q. 27, a. 2, r. to obj. 2.
289	22–32	*ST:* p. I, q. 85, a. 5, r. to obj. 3.
290	12	Maritain, J. *Op. cit.:* pp. 117ff.
291	17–18	*OT:* q. 1, a. 3. The whole of this question is of capital importance for an understanding of St. Thomas's theory of judgment.
291	28	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 268–72.
291	35–36	*On the Soul:* b. II, c. 5.
291	37–	
292	–3	*COS:* b. II, lect. 12.
292	3–6	*ST:* p. I, q. 83, a. 1.
292	14–21	*AG:* b. IV, c. 11.
292	32–	
293	–3	*ST:* p. I, q. 75, a. 3, r. to obj. 2.
293	6	Marbe, K. *Experimentell-psychologische Untersuchungen über das Urteil.* Leipzig: Engelmann, 1901.
293	15	Müller, G. E. and Martin, L. J. *Zur Analyse der Unterschiedsempfindlichkeit.* Leipzig: Barth, 1899.
293	25–28	Messer, A. Experimentell-psychologische Untersuchungen über das Denken. *Archiv für die gesamte Psychologie,* 1906, *8,* pp. 1–224.
		Brentano, F. *Von der Klassification der psychischen Phänomene.* Leipzig: Duncker und Humblot, 1911.
		Lindworsky, J., S.J. *Loc. cit.*
293	35–	
294	–7	*ST:* p. I, q. 17, a. 3; q. 85, a. 6.
		Chapter 24 THE INFERENTIAL PROCESS
295	1–11	*ST:* p. I, q. 85, a. 5
295	24–27	*AG:* b. II, c. 79.
296	11–18	*ST:* p. I, q. 58, a. 3, r. to obj. 1. See also a. 4.
296	21–	
297	–2	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 259–63.
297	24–	
298	–9	Lindworsky, J., S.J. *Op. cit.:* b. III, c. 6.
298	20	———. *Op. cit.:* pp. 261–63.
		———. *Das schlussfolgernde Denken.* Freiburg: Herder, 1916.

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		Störring, G. Experimentelle Untersuchungen über einfache Schlussprozesse. *Archiv für die gesamte Psychologie,* 1908, *11,* pp. 1–127.
		———. *Das urteilende und schliessende Denken in causale Behandlung.* Leipzig: Akad. Verlagsgesellschaft, 1926.
298	35–	
299	–2	*ST:* p. I, q. 79, a. 6, r. to obj. 2.
		Chapter 25 MOTIVATION
300	3–4	Spearman, C. "G" and After—A School to End Schools. *Psychologies of 1930.* Edited by C. Murchison. Worcester: Clark University Press, 1930, p. 359.
300	11–15	*In Petri Lombardi Quatuor Libros Sententiarum:* b. III, d. 26, q. 1, a. 2.
300	23	*ST:* p. I, q. 82, a. 2, r. to obj. 1.
301	6–13	*ST:* p. I–II, q. 10, a. 3, r. to obj. 3.
301	14–15	*On the Soul:* b. III, c. 10.
301	15–18	*COS:* b. III, lect. 15.
301	29	The science that expounds the meaning of values is called *axiology.* For an account of the values that move the will, see: McLoughlin, J. The Philosophy of Value. *Irish Ecclesiastical Record,* Sept. 1939, pp. 277–91.
301	30–	
302	–6	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 303–05.
302	7–	
303	–14	Lindworsky, J., S.J. *Op. cit.:* pp. 305–07.
303	15–34	Michotte, A. E. and Prüm, E. Etude expérimentale sur le choix volontaire et ses antécedents immédiats. *Archives de Psychologie,* 1910, *10,* pp. 119–299.
		Chapter 26 VOLITION
305	1–19	Spearman, C. *Psychology Down the Ages.* London: Macmillan, 1937, cc. 10 and 17.
305	20–	
306	–4	*OT:* q. 22, a. 12. *ST:* p. I–II, q. 8, a. 1; q. 27, aa. 1 and 2.
306	5–19	*ST:* p. I, q. 82, aa. 1 and 2; p. III, q. 18, a. 3.
307	19–21	*ST:* p. I–II, q. 8, a. 1., r. to obj. 1. For a study of the various kinds of will-act enumerated in the text, see: *ST:* p. I–II, qq. 8–16. For some further insights into the nature of will and its movements, see: *OT:* q. 22, and especially aa. 1, 3, 4, 10, 13, and 15.

PAGE	LINE	
307	22–	
308	–17	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 194–96. ———. *Der Wille.* Leipzig: Barth, 3rd edition, 1923. ———. *The Training of the Will.* Trans. by A. Steiner and E. A. Fitzpatrick. Milwaukee: Bruce, 1929, c. 1.
308	18–36	James, W. *Psychology.* N.Y.: Holt, 1900, pp. 429–34.
308	37–	
309	–14	*ST:* p. I–II, q. 14, a. 1.
309	14–16	*Nicomachean Ethics:* b. III, c. 3. In this same chapter, Aristotle makes reference to the important distinction between means and end, in the matter of the will-act. Thus, deliberation or choice, and therefore, counsel, are "not about ends but about means." A physician, for example, does not deliberate whether he shall heal, since that is the very end of his art. Rather, he assumes the end and then considers how and by what means he can bring about a cure. See also St. Thomas's *In Aristotelis Ethica ad Nicomachum:* b. III, lect. 5.
310	14	Ach, N. *Über den Willensakt und das Temperament.* Leipzig: Quelle und Meyer, 1910. Lindworsky, J., S.J. *The Training of the Will* (as above): pp. 35ff.
310	28–31	*In Petri Lombardi Quatuor Libros Sententiarum:* b. IV, d. 16, q. 1, a. 2, query 5, solution 1: "*Voluntas semel ad aliquid fixa, ab illo non divellatur quin actu vel habitu in eo maneat, nisi per actualem dissensum ab illo, vel in speciali, vel saltem in genere.*" An interesting moral problem is the connection between the modern notion of determining tendencies and St. Thomas's teaching on will-acts that are only *virtually* voluntary. On this point, see: Gruender, H., S.J. *Experimental Psychology.* Milwaukee: Bruce, 1932, pp. 404–05.
310	32–	
311	–9	Ach, N. *Op. cit.* Lindworsky, J., S.J. *The Training of the Will* (as above): pp. 43ff.
311	10–27	Michotte, A. E. et Prüm, E. *Op. cit.* in preceding chapter.
311	28–	
312	–7	Wells, H. M. The Phenomenology of Acts of Choice. *British Journal of Psychology,* Monograph Supplement, n. 11.
312	8–23	Ach, N. *Op. cit.* Lindworsky, J., S.J. *Experimental Psychology* (as above): pp. 313–15.

PAGE	LINE	
312	24–27	Selz, O. Die experimentelle Untersuchung des Willensakt. *Zeitschrift für Psychologie,* 1910, *57,* pp. 241–70.
312	27–	
313	–17	Lindworsky, J., S.J. *Experimental Psychology* (as above): p. 315.
		———. *The Training of the Will* (as above): pp. 50ff.

Chapter 27 ATTENTION

PAGE	LINE	
315	7	*AG:* b. I, c. 55. Here St. Thomas lays down the general law of attention when he says: "A cognitive power never actually knows anything except by attending."
		Pillsbury, W. B. *The Fundamentals of Psychology.* N.Y.: Macmillan, 3rd edition, 1934, pp. 357–58.
315	30–	
316	–10	*ST:* p. I, q. 85, a. 1, r. to obj. 1.
316	24–26	*ST:* p. I–II, q. 9, a. 1.
316	36	Breese, B. B. *Psychology.* N.Y.: Scribners, 1921, pp. 58–67.
317	23–32	*ST:* p. I, q. 85, a. 4. Also, r. to obj. 3.
320	9	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 323–28.
320	14–	
321	–2	Woodworth, R. S. and Marquis, D. G. *Psychology.* N.Y.: Holt, 5th edition, 1949, pp. 402–08.
321	3–	
322	–21	Lindworsky, J., S.J. *Op. cit.:* pp. 328–30.
322	25–29	Wundt, W. *Grundzüge der physiologischen Psychologie.* Leipzig: Engelmann, 4th edition, 1893, Bd. II, pp. 266–301.
322	33–34	Mach, E. *The Analysis of Sensations.* Trans. by C. M. Williams. Chicago: Open Court, 1914, pp. 178ff.
323	2–4	*ST:* p. I, q. 85, a. 7.
323	5–10	Ribot, T. *The Psychology of Attention.* Trans. by J. Fitzgerald. N.Y.: Humboldt, 1889.
323	17–23	Müller, G. E. *Zur Theorie der sinnlichen Aufmerksamkeit.* University of Göttingen, 1873.
323	32–36	Ebbinghaus, H. *Psychology.* Trans. by M. Meyer. Boston: Heath, 1908, pp. 87–92.
324	5–25	Lindworsky, J., S.J. *Op. cit.:* pp. 332–34.

Chapter 28 ASSOCIATION AND PRODUCTIVE THINKING

PAGE	LINE	
325	1–16	The reason that association of ideas follows the same natural laws as association of images is expressed by Aristotle (*On*

PAGE	LINE	
334	18–	
336	–11	Moore, T. V., O.S.B. *Dynamic Psychology* (as above): p. IV, cc. 7–9.
		———. *The Driving Forces of Human Nature* (as above): p. V.
		Allers, R. *Self Improvement*. N.Y.: Benziger, 1939, pp. II and III.
		Barrett, J. F. *Elements of Psychology*. Milwaukee: Bruce, 2nd edition, 1931, pp. 106–17.
		Chapter 30 HABIT
337	1–18	*ST:* p. I–II, qq. 49–61. These are the chief sources of St. Thomas's theory of habit. The clearest and most succinct statement of Aristotle on the nature of habit is found in the *Categories*, c. 8. The most important application of this teaching occurs in the *Nicomachean Ethics:* bb. II–V, which expound the notion of moral virtue, in its various forms; and b. VI, which is concerned with the intellectual virtues.
337	19–20	*ST:* p. I–II, q. 49, a. 1.
337	20–21	*Nicomachean Ethics:* b. I, c. 7.
337	21–22	*ST:* p. I–II, q. 52, a. 3.
337	22–	
340	–3	*ST:* p. I–II, q. 49, aa. 1–3; q. 50, aa. 1–5.
		OVG: aa. 1 and 6.
340	4–29	Bentley, M. A. Psychology for Psychologists. *Psychologies of 1930*. Edited by C. Murchison. Worcester: Clark University Press, 1930, p. 111.
		Sandiford, P. *Educational Psychology*. N.Y.: Longmans, Green, 1928, p. 104.
340	30–	
341	–6	De la Vaissière, J., S.J. *Educational Psychology*. Trans. by S. A. Raemers. St. Louis: Herder, 2nd edition, 1927, p. 235.
		Maher, M., S.J. *Psychology*. London: Longmans, Green, 9th edition, 1926, pp. 388–90.
341	30	Brennan, R. E., O.P. *Thomistic Psychology*. N.Y.: Macmillan, 1941, pp. 272–74.
343	2–8	Carr, H. A. *Psychology*. N.Y.: Longmans, Green, 1927, pp. 106–08.
		Watson, J. B. *Psychology from the Standpoint of a Behaviorist*. Phila.: Lippincott, 2nd edition, 1924, pp. 314–16.
		Thorndike, E. L. *Animal Intelligence*. N.Y.: Macmillan, 1911, p. 224.

PAGE	LINE	
343	9–21	*ST:* p. I–II, q. 51, aa. 1–3. *OVG:* aa. 8 and 9.
343	34–	
344	–6	*ST:* p. I–II, q. 52, a. 3.
344	7–26	*ST:* p. I–II, q. 53.
344	29–	
345	–5	Watson, J. B. *Behavior. An Introduction to Comparative Psychology.* N.Y.: Holt, 1914, pp. 184–85.
345	5–8	Langfeld, H. S. A Response Interpretation of Consciousness. *Psychological Review,* 1931, *38,* pp. 87–108.
345	14–22	Freud, S. *Beyond the Pleasure Principle.* Trans. by C. J. M. Hubback. N.Y.: Boni and Liveright, 1924. Hendrick, I. *Facts and Theories of Psychoanalysis.* N.Y.: Knopf, 1934, p. 103. In this connection I should like to observe that while the work of Freud and his followers has helped to reorient modern psychology towards a whole-making and personalistic view of man, the actual picture of human nature, drawn by the psychoanalysts, is of a pathological, rather than a normal, personality. Thus from the very beginning, psychoanalysis has occupied itself with what is disordered and unbalanced in the nature of man.
345	30–	
346	–2	McDougall, W. *An Introduction to Social Psychology.* Boston: Luce, revised edition, 1926, pp. 354ff. ———. *An Outline of Psychology.* London: Methuen, 3rd edition, 1926, c. 6.
346	11–28	James, W. *Psychology.* N.Y.: Holt, 1892, pp. 145–50.
346	28–29	*Nicomachean Ethics:* b. II, c. 1.
347	1–8	Woodworth, R. S. *Psychology.* N.Y.: Holt, revised edition, 1929, pp. 176–77.
347	17–37	Dunlap, K. A Revision of the Fundamental Law of Habit Formation. *Science,* 1928, *67,* pp. 360–62.
348	29–32	James, W. *Talks to Teachers.* N.Y.: Holt, 1899, pp. 65–66.
		Chapter 31 THE EGO
350	23–	
351	–10	Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, p. 284.
351	11–24	Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 291–93.
351	28–30	*ST:* p. I, q. 29, a. 1.
352	25	*ST:* p. I, q. 29; p. III, q. 2, aa. 1–3, and q. 16, a. 12. *OPG:* q. 9, aa. 1–3. *AG:* b. IV, c. 35.

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De Unione Verbi Incarnati: a. 1.

The development of the notion of person has brought several important issues into focus. We shall mention two here. The first concerns the real distinction between person and nature. Perhaps the most concrete way of expressing the difference is by saying that man *is* a person, but man *has* a nature. The idea of person as a *principium quod,* therefore, is much more fundamental than the idea of nature as a *principium quo.* The latter is a principle of movement or action; whereas the former is a principle of being. Yet, the nature of a thing, by the quality of its powers, determines the kind of action that the thing shall perform. Thus man thinks because he has a rational nature; and because he has a rational nature, he is a person. The real distinction of person and nature was a signal achievement of Christian philosophers who realized, by faith, that Christ had the nature of a man but was not a human person.

The second issue concerns the ultimate determination of rational nature which, when present, constitutes a person. The point has been debated for centuries; but most of the followers of St. Thomas take their cue from a passage in his treatise *On the Power of God* (q. 9, a. 3) where he says that "person signifies a certain nature perfected by a certain mode of existence." (See also a. 2, r. to obj. 1 and 2.) This mode of existence, which is a *mode of subsistence,* has a threefold task to perform in relation to the nature that it perfects: first, to prepare the nature to receive its own existence; secondly, to enclose the nature within itself; and thus, thirdly, to render the nature incommunicable. For a further discussion of the problem, see:

Garrigou-Lagrange, R., O.P. *Reality.* Trans. by P. Cummins, O.S.B. St. Louis: Herder, 1950, cc. 33 and 58.

Maritain, J. *Existence and the Existent.* Trans. by L. Galantiere and G. B. Phelan. N.Y.: Pantheon, 1948, pp. 62–68.

353 | 22–25 | McDougall, W. *An Outline of Psychology.* London: Methuen, 3rd edition, 1926, p. 426.

353 | 27–31 | Spearman, C. *The Nature of 'Intelligence' and the Principles of Cognition.* London: Macmillan, 2nd edition, 1927, p. 54.

354 | 13 | Flugel, J. C. *A Hundred Years of Psychology.* N.Y.: Macmillan, 1933, pp. 238–39.

Aveling, F. St. Thomas and Modern Thought. *St. Thomas Aquinas.* Edited by C. Lattey, S.J. Cambridge, Eng.: Heffer, 1925, p. 126.

354 | 14–16 | *ST:* p. I, q. 87, a. 1.

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		OT: q. 10, aa. 8 and 9. See also: Maritain, J. *The Degrees of Knowledge.* Trans. by B. Wall and M. R. Adamson. N.Y.: Scribners, 1938, pp. 108–09, footnotes.
355	3	Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 280–90.
355	5–15	Troland, L. T. *The Principles of Psychophysiology.* N.Y.: Van Nostrand, 1929, vol. I, p. 87.
355	19–24	Troland, L. T. *Op. cit.:* p. 89.
355	24–	
356	–6	Lindworsky, J., S.J. *Op. cit.:* pp. 286–87.
356	12–20	*ST:* p. I, q. 119, a. 1, r. to obj. 2.
356	21–	
357	–37	Lindworsky, J., S.J. *Op. cit.:* pp. 287–89. Oesterreich, T. K. *Die Phänomenologie des Ich in ihren Grundproblemen.* Leipzig: Barth, 1910, Bd. I: Das Ich und das Selbstbewusstsein. Die scheinbare Spaltung des Ich. ———. *Die Probleme der Einheit und der Spaltung des Ich.* Stuttgart: Kohlhammer, 1928. Franz, S. I. *Persons One and Three.* N.Y.: McGraw-Hill, 1933. *ST:* p. I, q. 30, a. 4, r. to obj. 2. Here St. Thomas says: "It is of the very essence of person that it be incommunicable." Accordingly, person must be unchangeable; from which it follows not only that it cannot be communicated to someone else, but also that it cannot give rise to several persons by the division of itself. John cannot become Peter. Neither can he become several Johns within the confines of his own being. The fact is that unless there were a permanent subject of change which is itself unchanging, there could be no growth and development in the personality or character of the same individual; just as without substance, firm and abiding, there could be no coming or going of accidents.
		Chapter 32 CHARACTER
259	1–7	St. Thomas has some interesting remarks to make on the various meanings of the word "character" in *ST:* p. III, q. 63, a. 2. It is obvious from his analysis that the term, in his day, did not have the rich and developed meaning which it has today.
259	15	Brennan, R. E., O.P. *The Image of His Maker.* Milwaukee: Bruce, 1948, c. 9.
360	1–10	Child, C. M. *Physiological Foundations of Behavior.* N.Y.: Holt, 1924, pp. 12–17.

PAGE	LINE	
		Gillet, M. S., O.P. *The Education of Character*. Trans. by G. Green. London: Burns Oates & Washbourne, 1927, pp. 18–22.
		Allers, R. *The Psychology of Character*. Trans. by E. B. Strauss. N.Y.: Sheed & Ward, 1934, pp. 34–40.
360	11–24	Woodworth, R. S. *Psychology*. N.Y.: Holt, 4th edition, 1940, c. 7.
		——— and Marquis, D. G. *Psychology*. N.Y.: Holt, 5th edition, 1949, c. 6.
360	25–32	Albert the Great. *De Animalibus:* b. XX, t. 1, a. 11.
360	33–	
361	–4	McDougall, W. *An Introduction to Social Psychology*. Boston: Luce, revised edition, 1926, pp. 120–24.
361	11–12	*AG:* b. IV, c. 11.
361	28	Allers, R. *Op. cit.:* pp. 21–28.
361	33–	
362	–2	Barrett, E. B., S.J. *Strength of Will*. N.Y.: Kenedy, 1915, p. 253.
362	2–9	Spearman, C. "G" and After—A School to End Schools. *Psychologies of 1930*. Edited by C. Murchison. Worcester: Clark University Press, 1930, pp. 359–61.
		St. Thomas clearly recognizes the force of values in the shaping of one's character. Thus in his XIIth *Quodlibet* (q. 14, a. 1) he speaks of several factors that can change a man's outlook on life, for better or for worse. The drunkard's focus is on wine, as the all-persuasive good; the libertine's, on women; the tyrant's, on a lust for ruling and commanding the destinies of people; the philosopher's, on the pursuit of truth.
362	10–31	Aristotle, as we pointed out in a previous chapter, discusses the cardinal virtues in his *Nicomachean Ethics:* bb. II–VI. Besides St. Thomas's commentaries on these books, see also:
		ST: p. I–II, q. 61.
		OVG: aa. 2, 4–7.
		De Virtutibus Cardinalibus: aa. 1–3.
363	3–7	James, W. *Psychology*. N.Y.: Holt, 1892, pp. 149–50.
363	18–21	Watson, J. B. *Psychology from the Standpoint of a Behaviorist*. Phila.: Lippincott, 2nd edition, 1924, pp. 319–21, and c. 11.
363	21–26	Flugel, J. C. Psychoanalysis: Its Status and Promise. *Psychologies of 1930* (as above): pp. 374–94.
		Allers, R. *The New Psychologies*. London: Sheed & Ward, 1933, pp. 15–16.
363	35	Representative works on individual psychology would include:

PAGE	LINE	
		Adler, A. *The Neurotic Constitution.* Trans. by B. Glueck and J. E. Lind. N.Y.: Moffat, Yard, 1917.
		———. *The Education of Children.* Trans. by E. and F. Jensen. London: Allen & Unwin, 1930.
		Klages, L. *The Science of Character.* Trans. by W. H. Johnston. London: Allen & Unwin, 1929.
		Kronfeld, A. *Psychotherapie, Charakterlehre, Psychoanalyse.* Berlin: Springer, 1925.
		———. Zur Theorie der Individualpsychologie. *Int. Zeitschrift für Individualphychologie,* 1929, *7,* pp. 252–64.
		Pfahler, G. System der Typenlehren. Grundlegung einer pädagogischen Typenlehre. *Zeitschrift für Psychologie,* 1929, Ergbd. *15.*
		Prinzhorn, H. *Charakterkunde der Gegenwart.* Berlin: Juncker und Dünnhaupt, 1931.
		———. *Psychotherapy.* Trans. by A. Eiloart. London: Jonathan Cape, 1931.
		Wexberg, E. *Individual Psychology.* Trans. by W. B. Wolfe. London: Allen & Unwin, 1930.
		For a study of the relationship between the traditional and the modern conceptions of character, the best work in English is R. Aller's *The Psychology of Character,* already referred to above. It draws heavily on the findings of Alfred Adler.
364	1–	
365	–37	Adler, A. *A Study of Organic Inferiority and Its Physical Compensation.* Trans. by S. E. Jellife. N.Y.: Nervous and Mental Diseases Publishing Co., 1917. See also:
		Allers, R. *The Psychology of Character* (as above): pp. 77–149.
366	19–27	*ST:* p. II–II, q. 161, a. 6.
367	7–14	Jung, C. G. *Psychological Types or the Psychology of Individuation.* Trans. by H. G. Baynes. N.Y.: Harcourt, Brace, 1923.
367	16–20	Woodworth, R. S. *Psychology.* N.Y.: Holt, 4th edition, 1940, pp. 156–57.
367	21–30	Kretschmer, E. *Physique and Character.* Trans. by W. H. J. Sprott. N.Y.: Harcourt, Brace, 1925.
368	3–25	Garrett, H. E. *Great Experiments in Psychology.* N.Y.: Appleton-Century, revised edition, 1941, pp. 100–01.
368	26–	
369	–3	Jaensch, E. R. *Eidetik Imagery and Typological Methods of Investigation.* N.Y.: Harcourt, Brace, 1930.
369	4–19	Heymans, G. De classificatie der karakters. *Vereen. Leities v. wetensch. arbeid.,* 1907.

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———. Des méthodes dans la psychologie spéciale. *Année psychologique,* 1911, *17,* pp. 64–79.

———. Typologische und statistische Methode innerhalb der speziellen Psychologie. *Scientia,* 1927, *21,* pp. 77–84. The categories of Heymans—*non-emotive active,* and *emotive non-active*—are suggestive of another psychological description of individuals as *aggressive* and *submissive.* The former become leaders; the latter, followers. Traits of this sort make their appearance early in life and are easily recognized in children as soon as they begin to play together. For a discussion of the point, see:

Katz, D. Personality. *Introduction to Psychology.* Edited by Boring, Langfeld, Weld. N.Y.: Wiley, 1939, pp. 75–78.

369 20–33 Spranger, E. *Types of Men. The Psychology and Ethics of Personality.* Trans. by P. J. Pigors. Halle: Neimeyer, 1928. See also:

Katz, D. *Op. cit.:* pp. 81–83.

370 1–

371 –3 Allers, R. *The Psychology of Character* (as above): c. 4.

Chapter 33 FACULTIES

372 5–9 *ST:* p. I, q. 77, a. 3. See also:

OSC: a. 11.

372 10–18 *On the Soul:* b. II, c. 4.

373 4–31 *OPG:* q. 10, a. 2, r. to obj. 4. Here St. Thomas says that every power "naturally works to attain its object."

COS: b. II, c. 24. In the passage to which we refer here, Aquinas says: "Form has one mode of being in the senses, and another mode of being in the sensible object. For, in the sensible object it has natural being; whereas, in the senses, it has intentional being." The same is true of forms present in the intellect: they, too, enjoy intentional being. The difference, of course, comes from the fact that intentional forms, in the senses, are still circumscribed by the contingencies of matter, since they are received into powers that are material in nature; intentional forms in the intellect, on the other hand, are completely devoid of all the appendages of matter. The former, in short, are particular, singular, and contingent; the latter are universal. The word "intentional," as J. Fröbes, S.J., points out, means that "the knowing power in some manner tends towards its object." (*Psychologia Speculativa.* Freiburg: Herder, 1927, vol. I, p. 4.) See also:

Allers, R. *The New Psychologies.* London: Sheed & Ward, 1933, pp. 59–61.

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374	32–	
375	–30	*ST:* p. I, q. 59, a. 2, r. to obj. 2; q. 77, a. 3.
		For a full account of St. Thomas's teaching on faculties, see:
		ST: p. I, qq. 77–83. For an excellent summary of the faculties of man, see:
		OS: a. 13.
378	12–	
379	–2	Glose, J. C. The Philosophy of Sensation. ***Proceedings of the American Catholic Philosophical Association.*** Wash., D.C.: Catholic University of America, 1934, p. 109.
379	2–5	Hartshorne, C. *The Philosophy and Psychology of Sensation.* Chicago: University of Chicago Press, 1934, c. 1.
379	22–26	Fröbes, J., S.J. *Op. cit.:* pp. 184–86.
379	27–30	Summers, W. G., S.J. The Psychology of Sensation. *Proceedings, etc.* (as above): p. 109.
381	23–	
383	–4	Spearman, C. "G" and After—A School to End Schools. *The Psychologies of 1930.* Edited by C. Murchison. Worcester: Clark University Press, 1930, pp. 340ff.
		The literature on the problem of factors, vectors, abilities, and so forth, has grown to large proportions. The following will serve as an introduction:
		Spearman, C. *The Nature of 'Intelligence' and the Principles of Cognition.* N.Y.: Macmillan, 2nd edition, 1927.
		———. *The Abilities of Man.* N.Y.: Macmillan, 1927.
		———. What the Theory of Factors is *Not. Journal of Educational Psychology,* 1931, *22,* pp. 112–17.
		Thurstone, L. L. *Vectors of Mind.* Chicago: University of Chicago Press, 1935.
		Thomson, G. H. *The Factorial Analysis of Human Ability.* Boston: Houghton Mifflin, 1939.
383	27–	
384	–18	Freeman, F. N. *Mental Tests. Their History, Principles, and Application.* Boston: Houghton Mifflin, revised edition, 1939.
		Garrett, H. E. *Great Experiments in Psychology.* N.Y.: Appleton-Century, revised edition, 1941, cc. 1 and 2.
384	19–29	Flugel, J. C. *A Hundred Years of Psychology.* N.Y.: Macmillan, 1933, c. 11.
		Garrett, H. E. *Op. cit.:* c. 3.
384	29–	
385	–2	*ST:* p. I, q. 85, a. 7; p. I–II, q. 51, a. 1. See also:
		Slavin, R. J., O.P. *The Philosophical Basis for Individual Differences.* Wash., D.C.: Catholic University Press, 1936.

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		Chapter 34 THE NATURE OF INTELLECTUAL KNOWLEDGE
387	1–7	Titchener, E. B. *Lectures on the Experimental Psychology of the Thought-Process.* N.Y.: Macmillan, 1909, lect. 1.
		Watson, J. B. *Behaviorism.* N.Y.: Norton, revised edition, 1930, cc. 10–11.
		Köhler, W. *Gestalt Psychology.* N.Y.: Liveright, 1929, c. 6.
387	18–26	*ST:* p. I, q. 12, a. 4.
		OSC: a. 1.
388	1–18	Maher, M., S.J. *Psychology.* N.Y.: Longmans, Green, 9th edition, 1926, c. 13.
		Moore, T. V., O.S.B. Gestalt Psychology and Scholastic Philosophy. *The New Scholasticism*, Jan. 1934, pp. 65–66.
388	19–32	*ST:* p. I, q. 84, a. 3.
388	33–	
389	–36	*ST:* p. I, q. 76, a. 2, r. to obj. 3; qq. 84 and 85.
		OS: a. 15.
		OSC: aa. 1, 2, 9, 10.
389	37–	
390	–22	*ST:* p. I, q. 76, a. 2, r. to obj. 4; q. 85, a. 2.
		OT: q. 1, aa. 1–3.
		OUI: c. 7.
		AG: b. IV, c. 11. Here St. Thomas says: "By [idea or] intelligible species, I mean that form of the thing understood which the mind conceives within itself. . . . That this intelligible species is not the thing which we understand is evident from the fact that it requires one act to understand a thing and another distinct act to understand the idea of the thing. This latter movement occurs [only] when intellect reflects on its act." See also:
		Noël, L. The Realism of St. Thomas. *Blackfriars*, Nov. 1935, pp. 827–30.
		Maritain, J. *The Degrees of Knowledge.* Trans. by B. Wall and M. R. Adamson. N.Y.: Scribners, 1938, pp. 106–08; footnotes, p. 155.
390	32–	
391	–9	Bühler, K. Kritische Musterung der neueren Theorien des Satzes. *Indogermanisches Jahrbuch*, 1919, *6*.
		———. Les lois générales d'évolution dans le langage de l'enfant. *Journal de Psychologie*, 1926, *23*, pp. 597–607. See also:
		Lindworsky, J., S.J. *Experimental Psychology.* Trans. by H. R. DeSilva. N.Y.: Macmillan, 1931, pp. 347–53.

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393	18–31	James, W. *The Varieties of Religious Experience.* N.Y.: Longmans, Green, 1902.
		For additional bibliographies on the psychology of religious experience, see:
		De la Vaissière, J., S.J. *Elements of Experimental Psychology.* Trans. by S. A. Raemers. St. Louis: Herder, 2nd edition, 1927, pp. 413–14.
394	1–2	Huxley, Julian. *Essays of a Biologist.* N.Y.: Knopf, 1923, p. 97. See also:
		O'Toole, G. B. *The Case against Evolution.* N.Y.: Macmillan, 1925, pp. 257ff.
394	7	This view of animal consciousness is developed in:
		Lindworsky, J., S.J. *Das schlussfolgernde Denken.* Freiburg: Herder, 1916, pp. 440ff.
		———. *Theoretical Psychology.* Trans. by H. R. DeSilva. St. Louis: Herder, 1932, pp. 122–30.
		———. *Experimental Psychology* (as above): pp. 347ff.
394	8–30	*AG:* b. IV, c. 11; b. II, c. 66.
		ST: p. I, q. 14, a. 1; q. 76, a. 1, and a. 4, r. to obj. 3.
		COS: b. III, lect. 5, 7, 13. See also:
		Gilson, E. *The Philosophy of St. Thomas Aquinas.* Trans. by E. Bullough. St. Louis: Herder, 1937, pp. 278ff.
		Chapter 35 THE NATURE OF VOLITION
396	21–	
397	–26	For a discussion of some of the modern points of view, see:
		The Psychologies of 1930, under the index headings (a) *psychophysical parallelism;* (b) *mind-body problem.* Edited by C. Murchison. Worcester: Clark University Press, 1930.
		Driesch, H. The Breakdown of Materialism. *The Great Design.* Edited by F. Mason. N.Y.: Macmillan, 1934, pp. 292–95.
		Maher, M., S.J. *Psychology.* N.Y.: Longmans, Green, 9th edition, 1926, pp. 517–24.
397	27–	
398	–4	DeKoninck, C. Thomism and Scientific Indeterminism. *Proceedings of the American Catholic Philosophical Association.* Wash., D.C.: Catholic University of America, 1936, pp. 58–76.
		Maritain, J. *The Degrees of Knowledge.* Trans. by B. Wall and M. R. Adamson. N.Y.: Scribners, 1938, pp. 183ff.; p. 227.
		Smith, V. E. *Philosophical Physics.* N.Y.: Harper, 1950, pp. 268ff.

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		Taube, M. *Causation, Freedom, and Determinism.* London: Allen & Unwin, 1936.
398	5–18	Allers, R. *The New Psychologies.* London: Sheed & Ward, 1932, pp. 15–16.
		———. *The Successful Error.* N.Y.: Sheed & Ward, 1940.
398	19–35	Watson, J. B. *Psychology from the Standpoint of a Behaviorist.* Phila.: Lippincott, 2nd edition, 1924, pp. 319ff.
		Langfeld, H. S. The Historical Development of Response Psychology. *Science,* March 10, 1933, p. 243.
		———. A Response Interpretation of Consciousness. *Psychological Review,* 1931, *38,* pp. 87–108.
399	22–29	Allers, R. *The New Psychologies* (as above): p. 46.
399	35–	
400	–6	The position of St. Thomas here is foreshadowed in the 10th chapter of Aristotle's treatise *On the Soul,* where the Stagirite first distinguishes between speculative and practical intellect—the former being concerned with knowledge for the sake of knowledge; the latter with knowledge which is directive of action, and therefore, of choice—and then goes on to say: "Every appetite is ordered [in its movements] to some end. For, that which is desired, precisely [as desired], constitutes the principle of movement for practical intellect; and that which is ultimate in the deliberations of practical intellect is the beginning of action"—since the final judgment of practical intellect is the motive for choice and hence of the exterior behavior that follows upon the act of choosing. As St. Thomas comments on the passage: "When we are deliberating about some course of action, we first set up a goal and then consider the various means [of reaching it] . . . The last thing that practical intellect judges about is the first thing that has to be done." (*COS:* b. III, lect. 15.) See also:
		OT: q. 22, a. 6; q. 24, a. 1.
		De Malo: q. 6, a. 1.
		Zigliara, T. M., O.P. *Summa Philosophica.* Paris: Beauchesne, 16th edition, 1919, vol. II, p. 404, annotation; pp. 408–11.
400	17–20	Mercier, D. *A Manual of Modern Scholastic Philosophy.* Trans. by T. L. and S. A. Parker. St. Louis: Herder, 1919, vol. I, p. 274.
401	3–19	*ST:* p. I, q. 83; q. 105, a. 4; p. I–II, q. 4, a. 4; q. 10; q. 13, a. 6; q. 17, a. 1, r. to obj. 2.
		OT: q. 22, a. 15; q. 24, aa. 1–6.
		AG: b. II, c. 48.
401	20–37	*De Malo:* q. 6, a. 1. Here St. Thomas says: "A form as understood [that is, an idea] is universal and can comprise

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		many things. Now when the focus of activity is on a particular object which does not exhaust the power of the universal, the inclination of will is itself poised indeterminately over many objects"; and again: "The indetermination of will is found, first of all, in respect to its act, since it can will or not will; secondly, in regard to its object, since it can will this or that." *ST:* p. I–II, q. 10, a. 2. Here St. Thomas clarifies the distinction just given: "Will is moved in two ways: first as regards the *exercise* of its act; secondly, as regards the *specification* of its act. In the first way, no object moves the will of necessity; for, irrespective of the nature of the object, it is in man's power not to think about it, and so not to actually will it. In the second way, will is moved by one object necessarily; by another, freely. . . . Thus if it be offered an object that is universally good, that is, desirable from every point of view, will tends to it of necessity—if it produces an act of volition at all—since it cannot will the opposite. If, on the other hand, it be offered a good that is not desirable from every point of view, it does not tend to such an object of necessity." (Italics mine.)
402	1–19	*ST:* p. I, q. 83, a. 1; p. I–II, q. 10, a. 2 (translated above).
402	20–	
403	–10	*ST:* p. I, q. 82, a. 2. *OT:* q. 23, a. 1. See also: Garrigou-Lagrange, R., O.P. *Reality.* Trans. by P. Cummins, O.S.B. St. Louis: Herder, 1950, pp. 189–91.
403	32–34	*ST:* p. I, q. 83, a. 1.
404	8–10	*ST:* p. I, q. 83, a. 1.
404	18	Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 223–24; 227–28.
404	20–22	Lindworsky, J., S.J. *Theoretical Psychology.* Trans. by H. R. DeSilva. St. Louis: Herder, 1932, p. 52.
405	8–12	*ST:* p. I, q. 62, a. 8, r. to obj. 3. See also: *De Malo:* q. 6, a. 1. *OT:* q. 22, a. 6. Transgressions of the natural moral law, as St. Thomas explains at some length (*ST:* p. I–II, qq. 76–78), can arise from three internal causes: ignorance, passion, and malice. The first is basically a defect of intellect; the second, of sensitive appetite; the third, of will.

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		Chapter 36 THE NATURE, ORIGIN, AND DESTINY OF THE HUMAN SOUL
406	1	In the traditional manuals, the nature of the soul is first analyzed, and then its powers of thought and volition. Here, in the interests of exposition, I have reserved the problem of nature till the last. As St. Thomas teaches (*COS:* b. II, lect. 6; *AG:* b. III, c. 46): in the order of exposition which is the psychological order of learning, the discussion of the soul's acts and powers precedes the discussion of its nature. But in the order of reality and existence, which is the ontological order of being, the nature of the soul comes first, since the soul has an intellect and a will only because it is a rational soul. In fine, the immaterial nature of man's soul is the root and principle, and therefore the fundamental cause of mind, will, and all the habits that are formed by these powers.
406	21–26	*ST:* p. I, q. 75, a. 2. See also: *OUI:* c. 2. *CT:* c. 79. *OS:* a. 14. Here St. Thomas sums up the argument clearly, thus: "The main reason why no bodily organ is able to receive the sensible forms of all natural things is that the receiver must be devoid of the nature of the thing received. . . . But intellect, by which we understand, is able to apprehend all sensible nature. Therefore its movement of understanding cannot be carried out by a bodily organ. From this it further follows that intellect has an operation of its own in which the body does not share." *AG:* b. II, cc. 49 and 50. Zigliara, T. M., O.P. *Summa Philosophica.* Paris: Beauchesne, 16th edition, 1919, vol. II, pp. 153–54. Maher, M., S.J. *Psychology.* N.Y.: Longmans, Green, 9th edition, 1926, pp. 469–73.
407	4–6	*ST:* p. I, q. 75, a. 2, r. to obj. 3.
407	6–11	*ST:* p. I, q. 80, a. 2; q. 82, a. 2; q. 83, a. 2.
407	27–35	*ST:* p. I, q. 75, a. 2.
407	36	*ST:* p. I, q. 75, a. 2, r. to obj. 1 and 2. See also: *OS:* a. 1, and r. to obj. 1 and 3.
408	3–26	*AG:* b. II, c. 49. Here St. Thomas argues: "Intellect, by its action, reflects on itself; for it understands itself not only as to a part but also as to the whole. Hence, an intellectual substance is not a body." His line of reasoning, in the passage referred to, is based on a premise which he takes from Aristotle's *Physics* (b. VIII, c. 5) where the Stagirite argues that no body is moved by itself, but only in respect of a part,

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		so that one part functions as mover and the other as thing moved. Aristotle, in turn, refers to the teaching of Anaxagoras, saying that the latter is right when he declares that the mind or soul is unmixed with matter because it is the ultimate principle of all vital motion, moving but not being moved (in the order of secondary causes), and having such supreme control over its movements that it can turn back its whole self on its whole self, in the act of reflection.
		Zigliara, T. M., O.P. *Op. cit.:* pp. 155–60.
		Maher, M., S.J. *Op. cit.:* pp. 466–69.
408	29–33	*ST:* p. I, q. 76, a. 1.
408	33–35	*ST:* p. I, q. 76, a. 8. See also:
		OSC: a. 4.
		Because it is a spiritual substance, the manner of the soul's presence in the body cannot be pictured imaginatively. St. Thomas warns us against the errors of those who, in dealing with incorporeal things, such as the human soul, employ the language of imagination instead of reason. For "imagination," as he says (*OPG:* q. 3, a. 19) "is founded on the senses . . . and cannot rise above quantity, which is the subject of all sensible qualities. Because of a failure to note this fact, and to transcend their imaginations, some have been unable to understand how anything can exist without being locally circumscribed."
409	5–9	*CT:* cc. 89–92.
		Aristotle. *On the Soul:* b. II, c. 3.
		COS: b. II, lect. 5.
409	9–15	*ST:* p. I, q. 75, aa. 2 and 3.
		AG: b. II, cc. 53 and 82.
409	21	Barbado, P. E., O.P. *Introduzione alla Psichologia Sperimentale.* Roma: Facolta Filosofica dell' "Angelicum," 1934, c. 4. Here an exhaustive account is given of the various theories on the body-soul problem.
410	18–23	Driesch, H. *Mind and Body.* Trans. by T. Besterman. N.Y.: Dial Press, 1927, p. 27.
410	25–	
411	–2	*AG:* b. II, c. 57.
411	7–26	*ST:* p. I, q. 76, aa. 1–5.
		AG: b. II, cc. 56–58.
		OSC: aa. 2 and 3.
		Brennan, R. E., O.P. *Thomistic Psychology.* N.Y.: Macmillan, 1941, pp. 69–73.
412	3–8	*ST:* p. I, q. 76, a. 1. See also:
		OUI: cc. 2 and 5.
412	12–25	*AG:* b. II, c. 57. See also:

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		ST: p. I, q. 75, a. 3.
412	28–	
413	–15	*OT:* q. 26, a. 10.
413	16–28	*ST:* p. I, q. 76, a. 1.
413	29–	
414	–5	*ST:* p. I–II, q. 5, a. 3; p. II–II, q. 164, a. 1.
414	16–21	*OPG:* q. 3, a. 8, r. to obj. 7.
414	22–33	*OPG:* q. 3, a. 9.
415	4–20	*ST:* p. I, q. 90, a. 1. See also: *CT:* c. 94.
415	24–34	*ST:* p. I, q. 90, a. 2. See also: *CT:* cc. 93 and 95. *OPG:* q. 3, aa. 1, 9, and 10. As St. Thomas points out (*OUI:* c. 3), Aristotle at least hinted at a creational theory in his treatise *On the Generation of Animals.* In the words of the Angelic Doctor: "Since the intellectual soul has an operation that is independent of the body, it does not have an existence wholly exhausted by its union with matter. Therefore, it cannot be said to be drawn forth from [the potentialities of] matter. Rather, it exists by virtue of some extrinsic principle. This is plain from the words of Aristotle: 'It must be concluded, however, that the intellectual soul alone comes from without and that it alone is divine'." This entire chapter is important because of its penetrating analysis of Aristotle's arguments for the immortality of the human soul.
416	18–20	*ST:* p. I, q. 89, a. 6. See also aa. 1–5.
416	20–22	*ST:* p. I, q. 89, a. 1, r. to obj. 3.
416	29–	
417	–11	*AG:* b. II, c. 81. *ST:* p. III, q. 50, a. 2, r. to obj. 2. *OS:* a. 1, r. to obj. 2. *COS:* b. II, lect. 1. *OPG:* q. 5, a. 10. *OSC:* a. 2, r. to obj. 5.
417	12–20	*AG:* b. II, c. 89. *OPG:* q. 3, a. 9. *ST:* p. I, q. 76, a. 3, r. to obj. 3; q. 118, a. 2.
418	23	Hugon, E., O.P. *Cursus Philosophiae Thomisticae.* Paris: Letheilleux, 3rd edition, 1922, vol. III, pp. 197–204. Here the respective merits of the successive-forms and the one-form theories are discussed. See also: Messenger, E. C. (editor). *Theology and Evolution* (a sequel to *Evolution and Theology*). London: Sands, 1949, p. II.

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419	3	*De Rerum Natura:* b. III.
419	15–25	Fell, G. *The Immortality of the Human Soul.* Trans. by L. Villing. St. Louis: Herder, 1908, Introduction and c. 1. The whole tenor of St. Thomas's great polemic *On the Unity of Intellect* is against impersonal immortality. Thus if all human minds were to be fused into a single mind, as he points out in the first chapter of this work, there could be no possibility of individual rewards for the good and of punishments for the wicked, since differences of recompense are founded on differences of souls.
419	33–	
420	–14	*ST:* p. I, q. 75, a. 6. *OS:* a. 14. *AG:* b. II, cc. 78, 79, 82. *CT:* c. 84. *In Petri Lombardi Quatuor Libros Sententiarum:* b. II, d. 19, q. 1, a. 1.
420	15–24	*ST:* p. I, q. 8, a. 1; q. 50, a. 5, r. to obj. 3; q. 104. *OPG:* q. 5, aa. 3 and 4. Taylor, A. E. *The Faith of a Moralist.* London: Macmillan, 1930, series I, p. 237.
420	31–37	*ST:* p. I, q. 75, a. 6. See also: *CT:* c. 104. *AG:* b. II, c. 55. *OS:* a. 14.
420	38–	
421	–10	The moral proof for the soul's immortality is indirectly established from one of St. Thomas's arguments for a future reunion of the soul with the body. As he puts it (*AG:* b. IV, c. 79): "In this life man, who is made up of body and soul, is either good or bad in his moral conduct. Hence, reward or punishment is properly due to him in respect to his body as well as his soul. But it is plain that while on earth man cannot receive the reward of final happiness. . . . Moreover, in many instances, moral transgressions are not punished in this life. . . . Therefore it is necessary to postulate a reunion of soul and body, so that in both soul and body man may be rewarded or punished [as he deserves]." For a full-length modern treatment of all the Thomistic arguments, see: Mainage, T., O.P. *Immortality.* Trans. by J. M. Lelen. St. Louis: Herder, 1930.
421	11–29	*ST:* p. I, q. 77, a. 2.
421	30–	
422	–12	*AG:* b. IV, c. 79.

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		OPG: q. 5, a. 10. *ST:* p. III of supplement, q. 75. The whole line of argument here can be summed up in the words of St. Thomas (*AG:* b. IV, c. 79): "It is against the nature of the soul to be without a body. But nothing unnatural can last forever. Therefore, the soul will not remain without a body. . . . Moreover, man's natural desire is to be happy; and his final happiness is to be completely perfect. . . . But when the soul is separated from the body it is, in a way, imperfect. . . . Hence, man cannot obtain final happiness unless his soul be reunited with his body."

SUBJECT INDEX